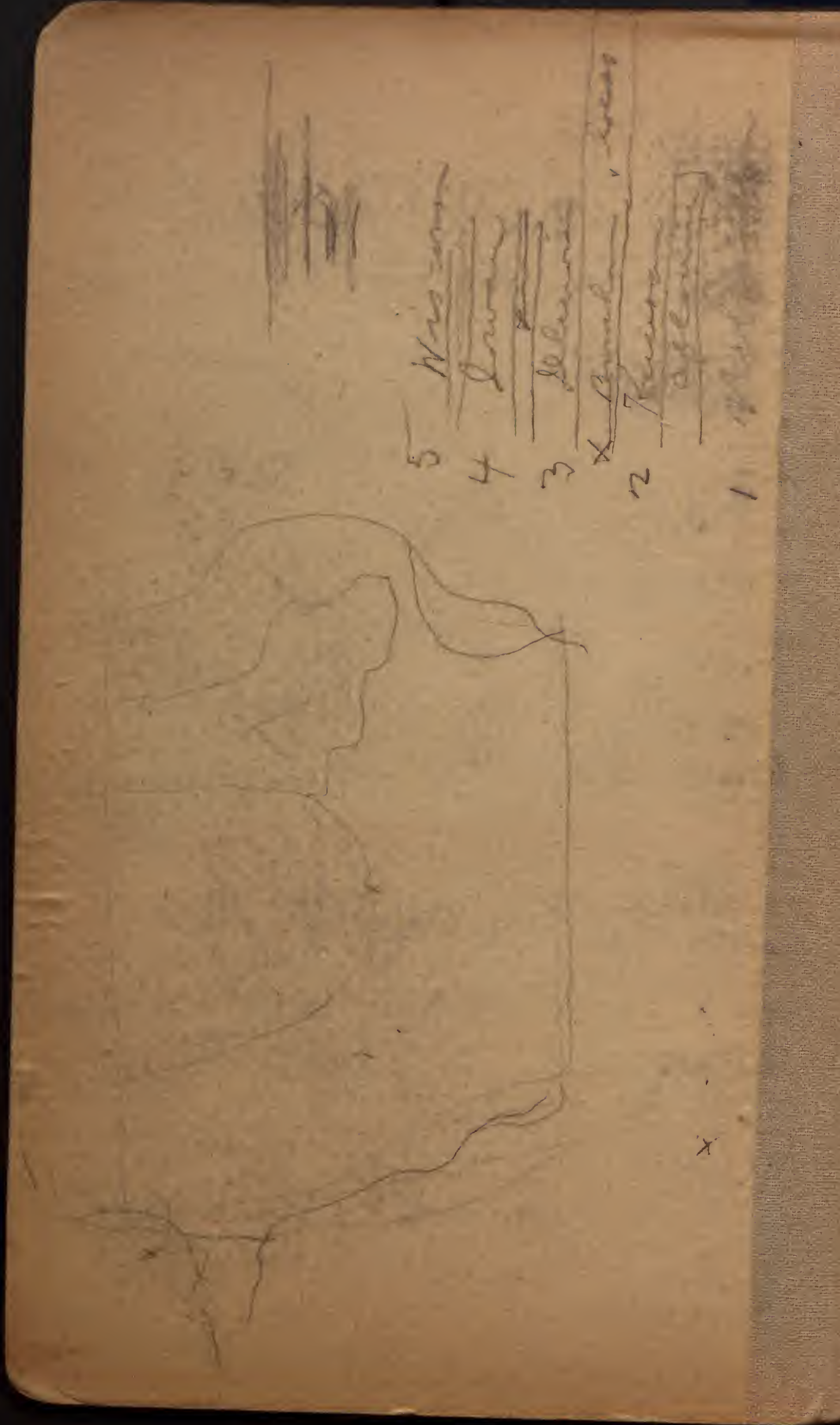


II 1910
Muscatine Co.
Plants.

Sionx Falls
+ Canton
Denison
So. Omaha
Rockport, Mo.



1

Sept. 3, 1910

Spent Am. morning.
 Drove northeast in afternoon
 with Mr. Root Sr.
 At x on E. sec. 31, Dayton Twp.
 N. of river, the gullies
 on E. side of road show a
 little less than a foot of
 calcareous yellowish material,
 evidently weathered Kansan, &
 yellow sandy stuff above.
 Some sand below.
 See sample of weathered Kansan.
 The S.E. cor. of sec. 19 on S. side
 eroded. The section on W. side
 is certainly calcareous Kansan,
 pebbles, joint structure, etc. mostly
 yellowish - bluish clonings.
 Leads to conglomerate point S. of
 Kilmartin. ✓ ✓
Plots 29 & 30
 Conglomerate
 bed
 below bed
 of
 the bed numbers 7 ft.

On E. side of creek in N. 1/2 sec. 28.
There is a spring up the slope.
It comes from a sandy place, with
Kansan up the slope, but it is
too badly submerged to show well.
The two sand-pits or pockets
in the S 1/2 of the same section
are at about same level, & show
fine sand (some evidently stratified).
There is clear Kansan up the
slopes above.
About 12 ft. of sand are exposed.
The top of this is 45 ft.
above creek N.

Northward, somewhat more
since there is a spring
which now comes out of sand,
about 25 ft. above creek.
Fine spring.

The gully described on the
next page is in the
great terrace & shows its
structure.

On the N. 1/2 of 21, just east³
of Peterson's farm there is
a deep gully cut into edge
of bench.
It shows 20 ft. of upper
gravel & sand, cross-bedded.
The top layer (2 or 3 ft.) is
very bouldery.

Nebraska is exposed for
at least two feet at base.
It is grayish (bluish) in
part darker, & is very similar
to material in boulders creek.
Spring map from top of
Nebraska in this valley.

On N.E. cor. of NW 1/4 - 29

E. part Darter Trip.

This is on the great bench
plain & a cut in road shows
clear caliche Kansan.

Crossed the great mound.

Road sections in it show that
it is Kansan. A few boulders
appear on slopes, rather high up.

In evening visited Mr.
Frost's home.

He gave me following section
of mound on which I found
pottery & teeth at Grants;

5'- Black soil mixed with gravel.

12'- Yellow clay & many pebbles
+ gravel.

3'- Stones mixed with black soil.

3'- Yellow clay mixed with stones,

2'- gravel.

5'- Stones & clay (yellow)

2'- Gravel (clear)

18'- Gravelly yellow clay with
bones

(Level of prairie)

12'- Black loam nearly free
from stones.

6'- Yellow undisturbed clay,
no (or very few) pebbles,

Sept. 4, 1910 Sunday
Drove with Mr. Paul Baubson (Raining)
Mr. Paul Baubson has
well on top near home:
2 1/2 ft. Soil + yellowish clay.
1 1/2 ft. Typical, very calcareous
pebbly Kansan, jointed.
1 ft. In sand (a little mixed) +
then a gravelly conglomerate.
This is a plume.

On the bluff NW. there is
a fine spring. Elevation:
The Kansan plain is 105 ft.
above lowest bottom.
A second terrace or bench,
rather narrow, is about 35 ft. high.
Spring is 75 ft. above bottom.
Water in this fine spring runs
over conglomerate.
The conglomerate is nearly
3 ft. thick, & below it
there is a very tough layer,
evidently Nebraska, which
is blue black just below
conglomerate, (a few inches)

7
and below it the stuff gets yellow
& gray.

There is some fine sand above
the conglomerate, but the bank
is badly slumped.

At the foot of the hill we
saw there are many plains
& in the ravine below, at
bottom, there are springs.

Mr. Baubson says:

Some coarse sand & fine gravel
appear 8 ft. above the big
spring, & Kansan above.
The dog has excavated here.

The Kansan plain nearly
goes up at least to 120 ft.
above bottom.

Yellow weathered Kansan appears
all along upper part of the bluff.
The highest point, W. of spring
(a few rods) is 130 ft. high.
There are mounds on this high
point.

A big spring comes out on
slope (it is a big seep and
also running spring) a few
feet below well N.E. of house.
A strong flow from a sandy
place. It probably runs
off the conglomerate.

all along road leading N.
from Canton to the plain
Kansan shows along road.
The plain is really cut up
quite a bit, yet northward
shows a few better beds.

In sec. 35, Springdale Twp.
there is a series of Kansan
exposures - very typical
jointed clay, laminar, bouldery
caliche. Best one about 7/8 mi. S.

N. of RR. on E. side of road
along creek a deep cut
(washout) shows bluish unweathered
jointed Kansan.

My high hill N. of RR. is 9
not continuous to W.D., but
runs down to a plain.
The highest point is not at
school, but at least $\frac{1}{2}$ mi. S.
A house stands on it.
W.D. - some distance - there appears
another heap (this evidently in
great bend of the Big Sioux)
Between section 18 + 11 (N. of
the church) there are several
good Kansan exposures made
by road cuts.

Off. Iowa state line.
Louis^{A.M.} Egge, - well on
bottom near house:

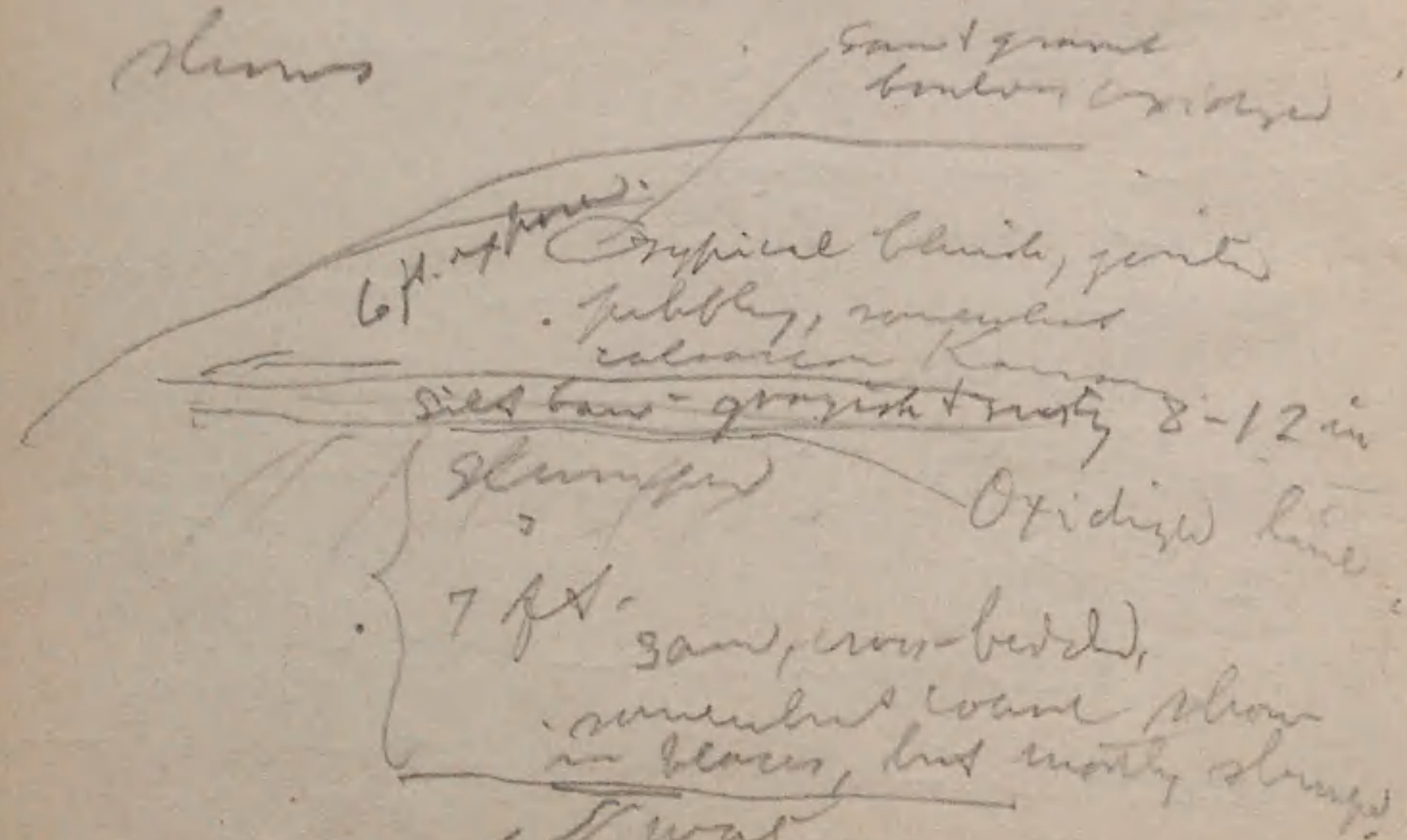
Dirt down to sand.
Probably 2 ft. coarse sand, some
boulders.
Probably touch Sioux Q. at
25 ft.

There are numerous shingles
on the slope between house &
edges of rock. These beds rise
about 40 ft. above lowest bottom.

On N. side of the ridge which ends in Sioux Q. ledges, there is a large spring, - quite a stream running from it.

4 or 5 rods up the hollow SW. of house numerous springs come out from under Kansan (typical bluish, rusty in places, pebbly, with sand boulders).

There is sand in the creek bed. A fine exposure on S. side, which is on N. side of ridge ending in Sioux Q. ledges, shows



In bed of creek is dark much which may be carbonaceous.

Numerous springs appear along this. From same slope.

This is another spring a few rods S. are really not in main ridge.



The Sioux Q. was evidently cut by valleys before drift came in.

The Sioux Q. ledges are about 35 ft above ^{big} spring.

In the NW cor. of sec. 35,
Springdale Twp. The steep
face of Kansan shows
ent. steps. I have noticed
this elsewhere on the Kansan
steps.

At (approx. 8- by 100 Twp)
There is a great slump -
I could trace Nebraska up
for 25 ft above bottom.
Then a slumbly Holocene
with springs, sand & gravel
worked out - probably
8-10 ft - then good
Kansan above.

A whole series of
washouts slumps - gullies
beading in same level -
appear above this.

13
a greater slump further S.
show dark joint clay below,
but this may be Kansan.

No water here.

Near bridge a spring (ready)
appears along same line.

Walked up the river about $3/4$ of
a mile. The bluffs are very
rough & heavily timbered but I
saw no exposures (could not
reach the slump further north on
account of rain & late hour)
& no springs.

Returned to Canton and
reviewed notes, etc.

From exposure at
lower end about 5 ft. above water
Top of Nebraska 35 ft. above bottom
Top of Affinion jointed 60 ft. "
Top of Kansan 85 ft. "

The Kansan is jointed, brown, fully
with two strata of gray silty fine-jointed
with (see sample from lower one)
Core 7 in = 6 ft from top
Other 10 in = 10 ft " "
From top to about 50 ft. alt. (from bottom)
fine sand & gray fine-jointed sand

Sep. 5, 1910 (Monday)

Spent forenoon in packing, writing letters, looking up notes, etc.
Sent two baskets to Dr. S. S. (13.5)

At 2 P.M. went to Fairview by rail.

Rained A.M. but P.M. was quite clear.

Went to Fairview. Fine exposure

at (A) in sec. 16.

Lowest bottom about 5 ft. above water

Top of Nebraska = 35 ft

Top of Aftonian sand & silt = 70 ft.

Top of Kansan = 85 ft.

The Kansan is jointed, brown, pebbly, with two streaks of gray silty fine-jointed stuff.

(one sample from lower one)

One 3 in = 6 ft. from top

Other 6 " = 10 " " "

From top to about 55 alt.

(from bottom) fine sand

and fine gray fine-jointed silt

alternate, - silt 2-6 in, fine sand more.

At 1 - the sand becomes coarser & pebbly, then fine, then coarse. Coarser below.

Ferruginous line below most of silt band.

Going up

Lowest bottom - 0

Top of Nebraska - 95

" " uppermost fine sand 55

" " lower gray streak 65

" " Kansan 80.

The lower gray - probably below Aftonian - 2 ft. deep

Upper gray is only in streaks -

The sand & silt alternate in upper part, & silt bands appear below.

The sand & fine gravel (at least 2 good layers of latter) are cross-bedded, in places

ferruginous & look Aftonian. The Nebraska is brown, jointed in part gray, rusty, with very

dark carbonaceous material
in contact with Aftonian
For nearly a foot above
Webrachum there are
numerous alternating sand &
silt bands.

The contact with Kansan
is abrupt.

The top of terrace on N. E. side
of river is about on level
with top of Aftonian, but
this is true back near
hills, - the front of terrace
is lower, but above base
of Aftonian

Probably 2 ft. of Webrachum
was exposed, not covered
with talus.

Farther W., sandy &
shrimy plains appear
1 spring

The S. Dak. riv. line is about
15 rods east of Iowa rd. line

17
On the garden place there
are springs coming out right
on top of terrace, at foot
of hills. There are three
big springs, the last comes out
of sand under Kansan. Others
are sandy.

One is farther S.W. and lies
farther.

I can see sand (Aftonian
coarser) in little bands at
foot of hill along road.

In bend of river near - (W)
is a bank of Kansan, blue,
granitic, calcareous, few
few boulders, 20 ft. exposure.

For a mile up the river
west to bluff there are
mounds & ponds, & sandy
places.
Near upper end of crevasse
is a big slump, - end off by
mounds, & with a creek course.

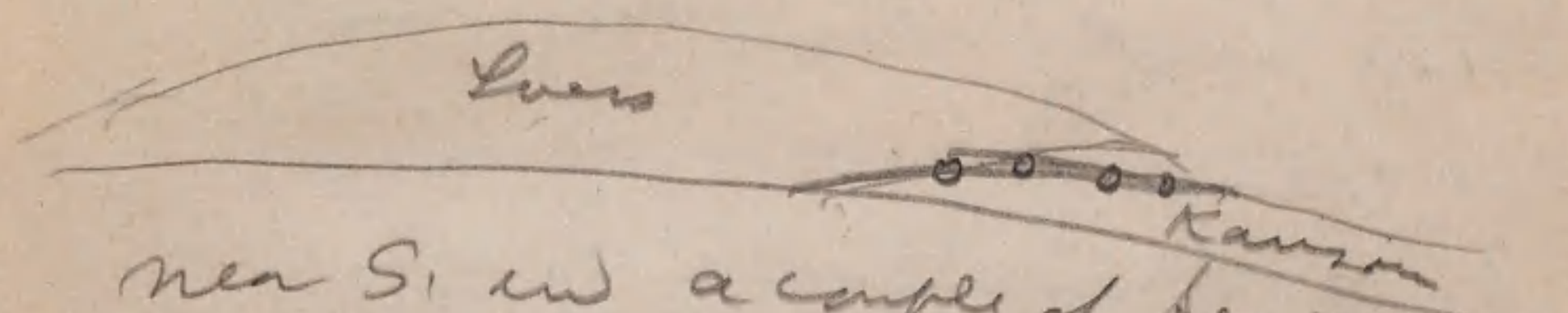
where road runs up
on terrace or bench
plain, on S. side 10-
15 ft. typical Kansan
is exposed.

This is the bit of Kansan
plain W. of river. It
is somewhat higher
than terrace S. (W.) of
the river, on the Iowa
side.

Sep. 6 - (Tuesday) 1918

Left Canton at 6:45 am. for
Hudson.

Drove N. on Iowa side,
near N. end of line between
no. 5 & 6 on low rounded
bluff - (these are all that
away up for some distance)
there is a cut about 6 ft.
shows yellow loess, nodular
above looking E.



near S. end a couple of feet
of Kansan exposed - also
on slope south.
Could see only one loess.

Similar yellow loess shows a
mile E..

The new C. M. & St. Paul gravel
pit is just being stripped - a
yellow loess top-dressing - 2-4 ft.

At x E. of Hudson the road
goes down & again up on edge
of terrace. It is gravelly &
somewhat coarse-sandy at both
points.

Between ^{Rock.} ~~mi.~~ ^{5 1/2} 28 & 29 - S. of river
there are two road cuts showing
3-4 ft yellow loam (under blue)
& Kansan below.

The ridges toward river are
Kansan - boulder-strewn.
Loam on top.

Saw spring below at about
terrace height down the river.
at bluff there is a nice
streamlet coming out of some
large ravines & it has
much sand washed in bed.

At N. exposure on same line
(2) the yellow loam runs down
into fine laminated sand
(probably wind-blown).

A line of boulders appears
at the base of the sand on
a gray silty base.

In bank of creek at foot of hill²¹
the gray silt (afternoon?) rises
over 20 ft. & springs come out
above it.

Where freshly washed it is tough &
whitish.

The creek has much sand

The bluffs at river are about 135
ft. above (lower) valley.

At Iowa end of bridge across the
Big Sioux a road-cut shows 4 or
5 ft. of sand (silty) and under
it a bouldery layer & gravel.

cut 1

At Hawarden visited the
C.M. sand pit. It shows
sand & gravel, cross-bedded,
with small irregularities &
alternations, to a depth of
about 20 ft.

On top of it 4-6 ft. of
silty sand (or sandy silt)
from the soil.

A very few very large
boulders have been taken
out.

This looks altuvian

cut 3 Found gravel exposed along creek, & whenever
they dig a well or excavate gravel
abundant. Visited also C.M. sandstone
pit. This shows 5 ft. of sandy silt & then
fine gravel. Below cleaner sand &
gravel, cross-bedded

cut 2 At dam outcropping of
crystalline shale appears
below.

Sep. 7 - (Wednesday) 1910 ²³

Started N. from Hawarden with

Perk Stone.
sec. 4 At N. end of road just S. of bridge between
nos. 14 & 15. There is a road cut which
shows about 5 ft. of brown silty sand
(at top sandy silt) with occasional pebbles,
& below it coarse gravel & small
boulders, - dirty, like the upper
layer - usually. —

At (5) on S side SE 1/4 sec. 14 - 95-48

on the first rise (road, part way up hill)
shows sandy silt above, then washed & mixed gravel
& at a depth of about 5-6 ft. a mass of
boulders, etc. in bed of gutter. ^{this is evidently} all Kansan.
sec. 5 The top of the hill, just W. of sec. corner,
shows yellow loess (upper part nodular).
This extends down hill westward for a
considerable distance.

cut 7 - This is small cut along
downward slope (S. N.) along road
& shows loess above (yellow & nodular)
and part way down slope a band of
boulders, etc. appear. They are a
part of Kansan which is clearly
exposed on slope.

cut 8. Exposure at S.W. end
of crescent of bluffs N. of
Hawarden.
From top of bluff (ridge) to
top of Aftonian 75 ft.

The Kansan appears here. It
is weathered, gray, pebbly,
but jointed, bluish, etc. deeper.
It is surely Kansan.

The line between Kansan
& Aftonian shows a little
mixing & oxidized band.

The Aftonian has been,
carried a great clumping
but I found a very good section
in the undisturbed bank
showing position clearly.

The Aftonian in exposure
in shot & shows rather
coarse sand & small pebbles,
layers of finer sand, etc.
Some of the sand is much
oxidized. It is the usual
Aftonian mixture.

Springs come out at base &

25.
judging from position of them
the Aftonian is about 20 ft. thick.
A very heavy gray joint layer
(see sample) rises about 4 ft. above the water.
It has brown (plant-like) streak
in it, & may be the same.

In N.E. end of same bluffs
springs come up about 80 ft. from
top & Aftonian now crops out
here & there below Kansan.
Quite a pond at base of this
part of exposure.

Opposite N.E. end, near river,
blocks (one separately isolated) of
bluish shale appear at 95
ft. from top.

I could not get relation of
other strata to it.

Photos 21 & 22 show cut
8 - looking nearly S.

The river is 160 ft. below top
of bluff.

Another sharp stream farther up
river, but overgrown.

Cut 9. 1st cut E. of Harwarden
on Co. rd. (new cut)
This seems to 7 ft deep &
shows yellow loam with bluish
streaks below.

Cut 10 is just east & is
long, & we greater part
10-14 ft. deep. Elevation
it runs probably 20 ft.
It shows Kansan, much
of it with few pebbles in
west part, where it looks
like a wash.

Back nearly 1/2 way from west
end there is typical bluish,
feruginous stain, calcareous,
pebbly Kansan.

It breaks off abruptly.
The part above true Kansan
shows much sand in lower
part, especially between two
humps of Kansan.

It is stratified & ferruginous.
The tough Kansan like material
(or lower like) is also more or less
stratified towards base.

N. side of cut 10

(see next page)

5-6 ft
Dark
feruginous sand
Kansan like, few pebbles

Sandy & fine
In this part like brown, but joints
(are ransaged)

Lower part divided
sand & upper ferruginous
sand

Kansan
Tough
Kansan

Nebraskan
loam

Nebraskan loam
(see sample)
Small dark green loam

S. side cut 10

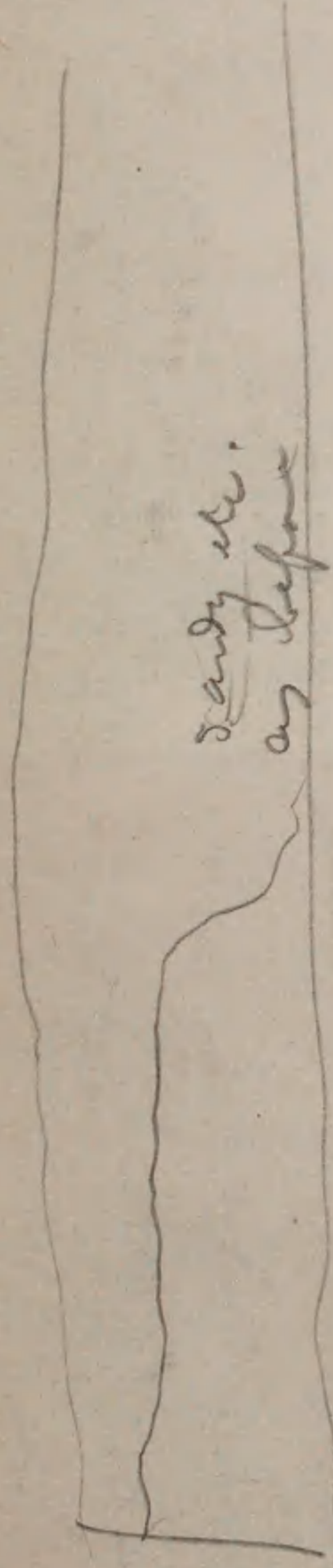
Ruddy sand
Kansan - Consistently tough

Kansan

Like Kansan

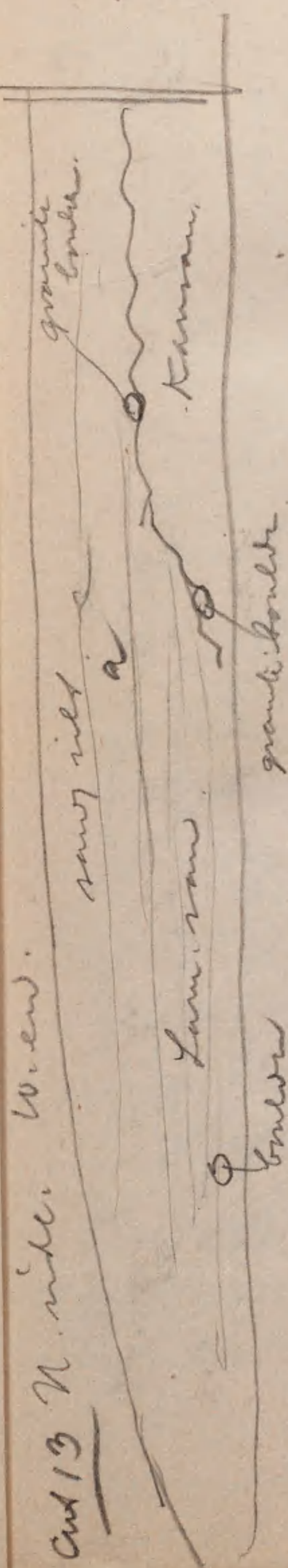
The Kansan contains some boulders & toward W. end they
strike sand layers. Springs come out "on very
clay". Kansan also has Nebraskan boulders - boulders. (see sample)
One mile posted inland from boulder line drain.

2. NW 1/4 side cut 10

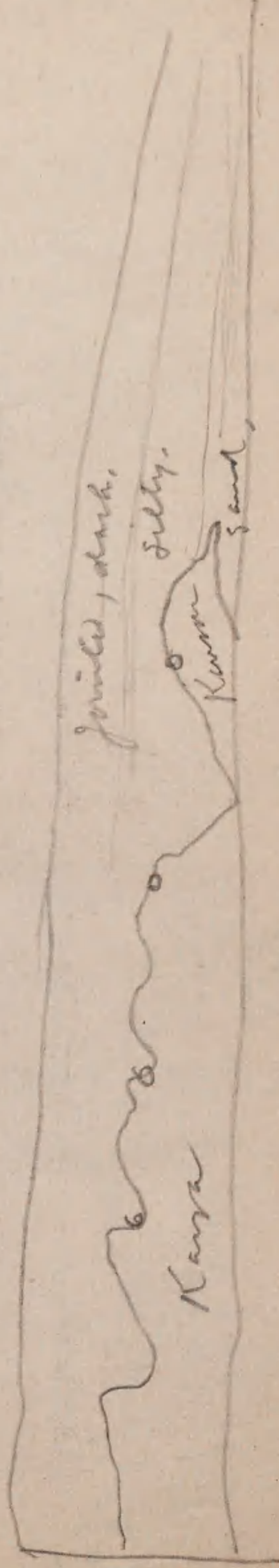


cut 11 is small but similar 8 cut 10.
 Shows clean Kansan below, with irregular
 contour, & the Kansan-like stuff above
 cut 12 shows 6-8 feet of yellow loam, weathered above
 & in some places sandy below.
 The cut was made below RR grade on a long
 gentle slope, for the purpose of getting full.

cut 13 N. side. W. end.

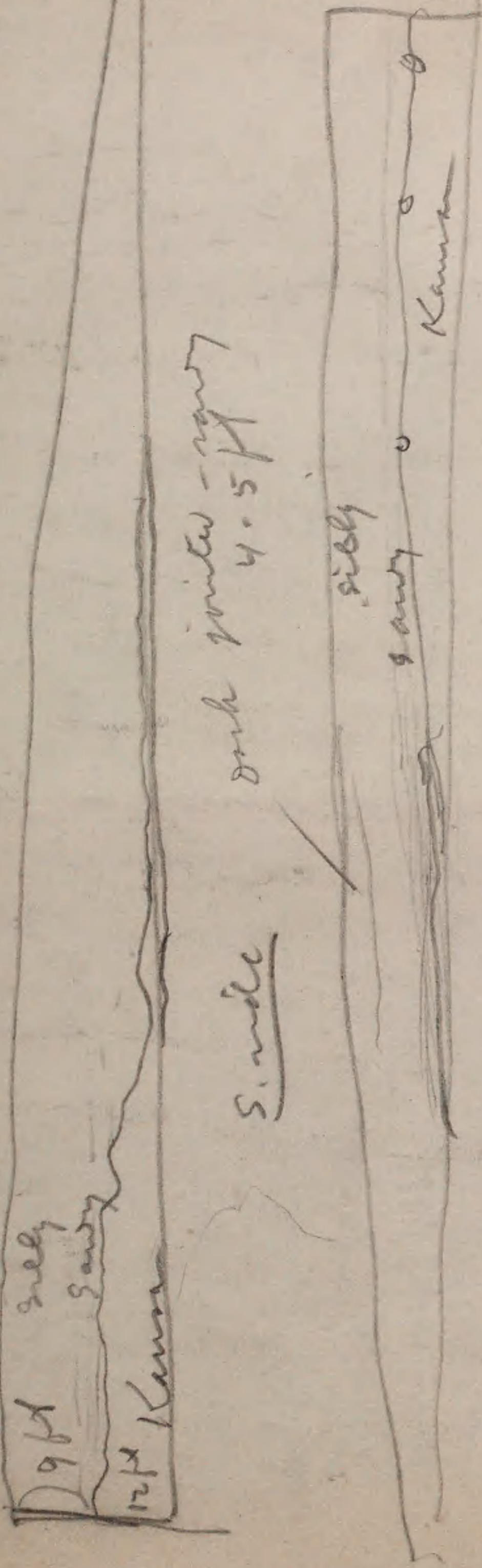


It is somewhat loam-like, but tougher & it
 contains streaks & bands of mud lime nodules,
 there are pebbly pockets just above sand.
 The Kansan contour is rough & irregular, wavy.
 S. side. W. of bridge.



cut 13. This reaches a depth
 of 18-20 ft.

cut 13 E. of another house - cut
N. side



All these cuts are in lower parts of a series of low hills by which surface rises eastward from Kanran. They do not cut the highest parts.

The highest ridge S. are 70 ft. higher than top of cut 13

1170
1240

Mud above Chatsworth. The top of ridge is 95 ft. above RR. Reads 1065.

The first little cut at N. end shows 10 ft. of cretaceous shale with 3-6 ft. of typical Kanran above it.

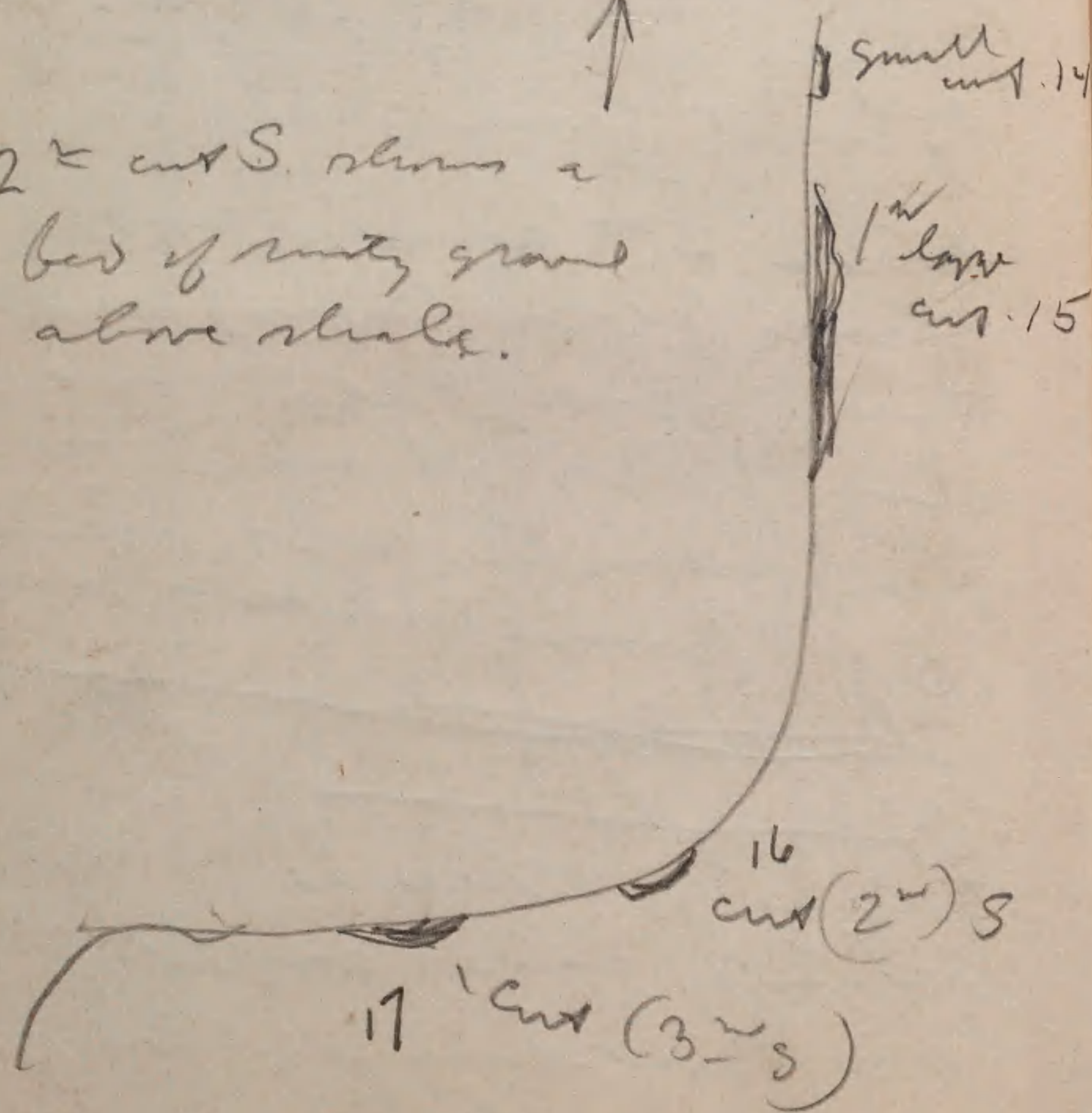
In the 2nd greater cut shale (blue below) reddish sticky above (see samples) rises to 35 ft. above RR. Then laminated sand at base 8 or 10 ft. running into loam (see sample). ~~These cuts are off the top of Kanran~~

RR cuts to top. Now N. there is a band of rusty sand & gravel with some boulders resting directly on shale. It shows in places 1-3 ft thick. Above

it is fine laminated
sand running upward
into loess.

The upper part of the
shale looks & feels
much like Nebraska.
Nebraska derived
from Cretaceous,
No pebbles in this.

2nd cut S. shows a
bed of rusty gravel
above shale.



33
The 3rd cut is E (N.) and
shows a bed of very fine
sand & gravel directly
on shale, 1-2 ft thick,
then fine sand. Then loess.

The 2nd cut S. at S (W) end
shows 4 ft. of rusty gravel
with a few small boulders,
resting directly on blue shale
(cuts with hoe - much better
laminated)

Then on this rest about
4 ft. more (as far as I could
see) of rusty & somewhat
pebbly sand.

Upward fine laminated
sand.

Then loess.

The RR is about 25 ft
above bottom.

cut 18

2 mi S. of Hawarden
along wagon road is a
deep (12 ft) loess cut
(both sides road).

It is yellow, few nodules
(mull) above, laminated
below, and all loess.
Seem to get somewhat
fine-sandy in lower
parts in places.

Sept 8 - (Sunday) 1910³⁵

Left Hawarden at 7:40 am
for Akron.

Took train out of Akron &
drove N.

cut 5 Just N. of cemetery, low down, there
is a cut on E. side road which
is all fine sand except soil
(sandy) above.

cut 6 - This is Strobeln Bros. pit.
It is up a slope, at end of ^{about} ridge.

The material is exposed about 10 ft.

They have gone about 3 ft.
further & found nothing but sand
& gravel.

The upper 6 ft. is mixed, coarse,
feruginous stuff with some boulder, some
rotten.

There are streaks & bands of white
sand below.

Just lower springs come out, &
all along the bluff here for
some distance springs come out at
same level. This line of spring &
steep flanks runs N. about 40 rods
& south about 1/2 a mile.

Reading top of bank (new drive)	1200
" " base of bank	1188
" " level of spring	1172
" " bottom (level of RR)	1125
RR about 5 ft. higher	

Drove to Otis Mill bluff above
Chattworth -

Reading at river level = 1025

" " top of shale
in road = 1115

" top of net = 1140

Kansas rises to 1170

typical, fossils, dashes below,
pebbles & a few boulders.

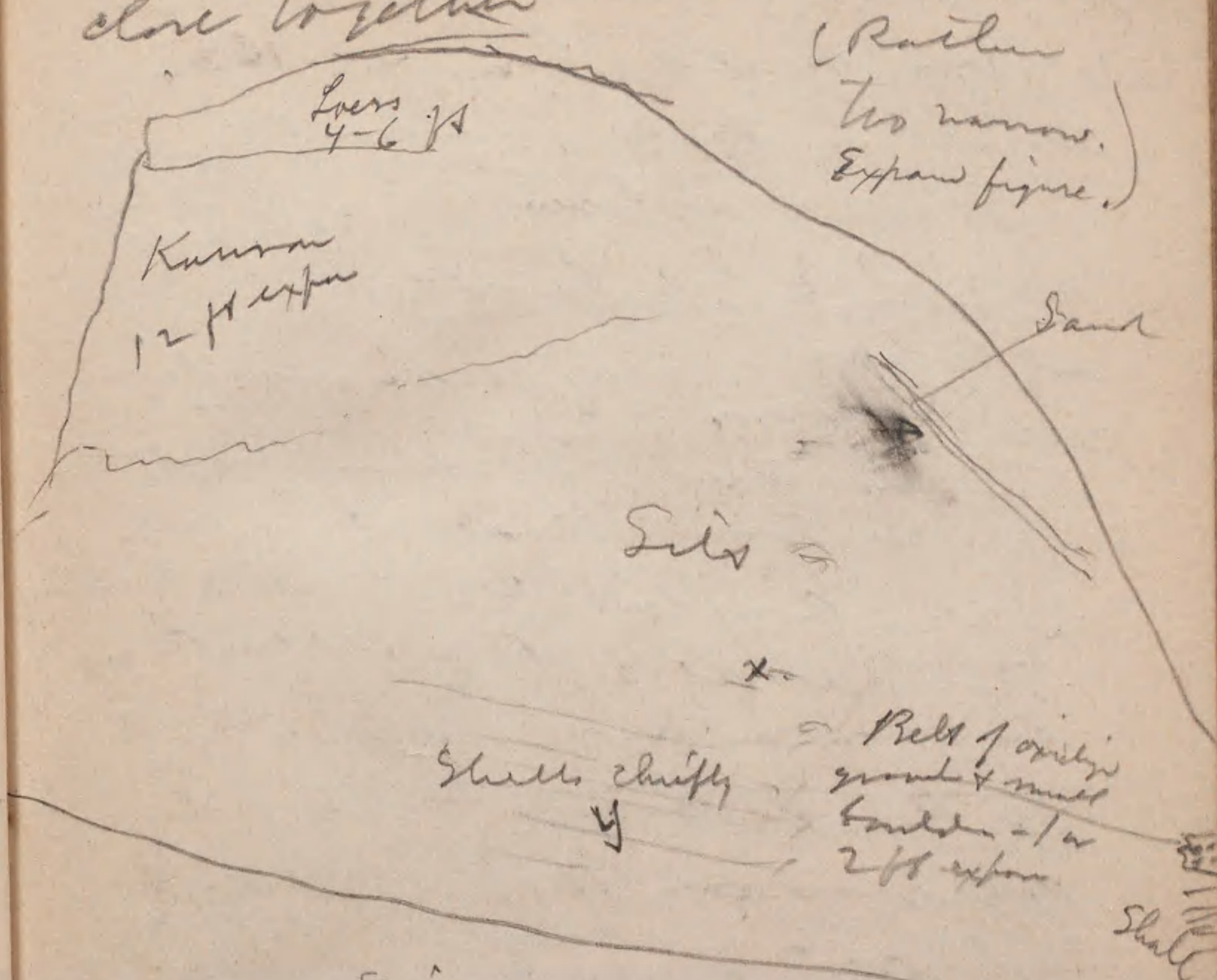
12 ft. exposure.

On top 4-6 ft. of yellow loam
sand seems to run up to about
1140. There seems to be only
a narrow band of it, but
the net, varying from gray to
almost black - is fully 20 ft
exposed; it contains fragments
of shells even in upper part,
but most of my collection was
made from lower part which
is dark.

The Kansan has sand boulders
in its lower part.
Could not make a clean

section, but parts were pretty
close together

37



Otis Mill bluff
So. Dak.

Took sample of loam + 2 of silt.
at x + y (under road)

Blue shale abides at water
& rises above in ledge

Very near the shale is
gray or rusty. Just exposure?
Probably naturally so - as far
as I could break in.

N. of main exposure I cut
 the rusty coarse sand & gravel
 & a few small boulders lying
 on brown shale, - about a
 foot or so exposure.

Returns to Chatworth

afternoon.

Cut 19 shows 6 ft. of yellow loam,
 nodular above. It shows laminar
 below (weathered). Road cut.

Cut 20. Road cut top of hill & slope
 shows about 5 ft. of yellow loam,
 nodular above.

At Bluffs

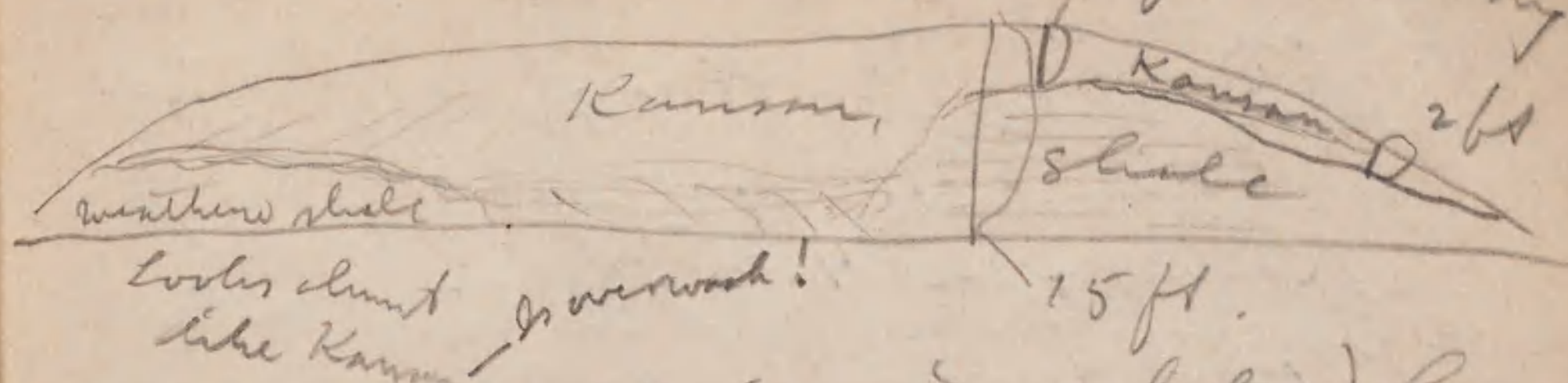
Bottom reads 1160
 (this is not lowest bottom, but
 terrace).

RR. reads 1180.

cut 14 shows irregular
 weathered shale with
 some Kansan, typical,
 above it. It seems
 that the shale eroded
 irregularly & Kansan filled
 in.

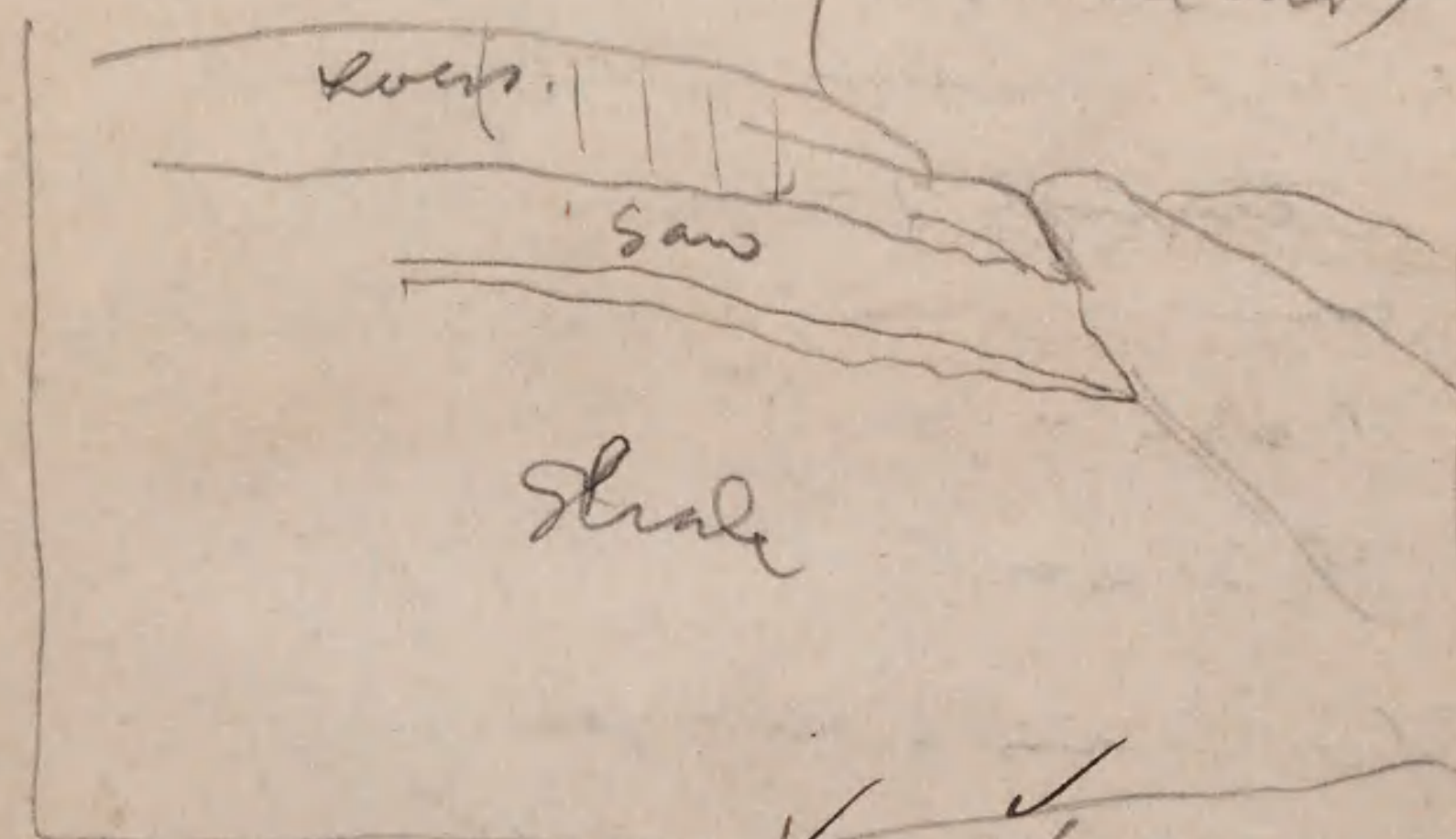
see figure next page,

39
 cut 14/ about 200 ft.
 5 ft. long



The Kansan (oxidized below) here
 lies on Cretaceous shale.
 This cut is at end of mill spur.

cut 15 (S. end)
 (main cut)



Photos 15 & 16

The south end of cut 15 shows
clean & clear.

R.R. runs 1180.

Top of shale 1215

Kansan - 4-5 ft

Sandy for a foot or two above
Kansan & this grades up
into 6-7 ft. of yellow loess -
almost without nodules.

A few ^{small} boulders appear
on top of Kansan.

The Kansan is typical,
bluish & brown, with pebbly
calcareous; sand boulders,
(small - bar)

This part of cut is fine.

The sandy layer is
clearly between Kansan
& loess & grades up
into latter. It is
somewhat laminated,
& fine

S. end.



In the south part of the cut the sand seems
to rest directly on the shale, except in the part
of the section which shows: (see other side.)

New System cut 15

Loess
Heavy
Sand
Kansan
Ferruginous sand & gravel
Shale

Of the lower sand & gravel (aftonian) there is a 1 or 2 ft.

Then a foot or more of Kansan & then fine sand, laminated, at least 5 or 6 ft, grading up into yellow loess

which passes to S. stands in columnar wall & is at least 12 ft. thick

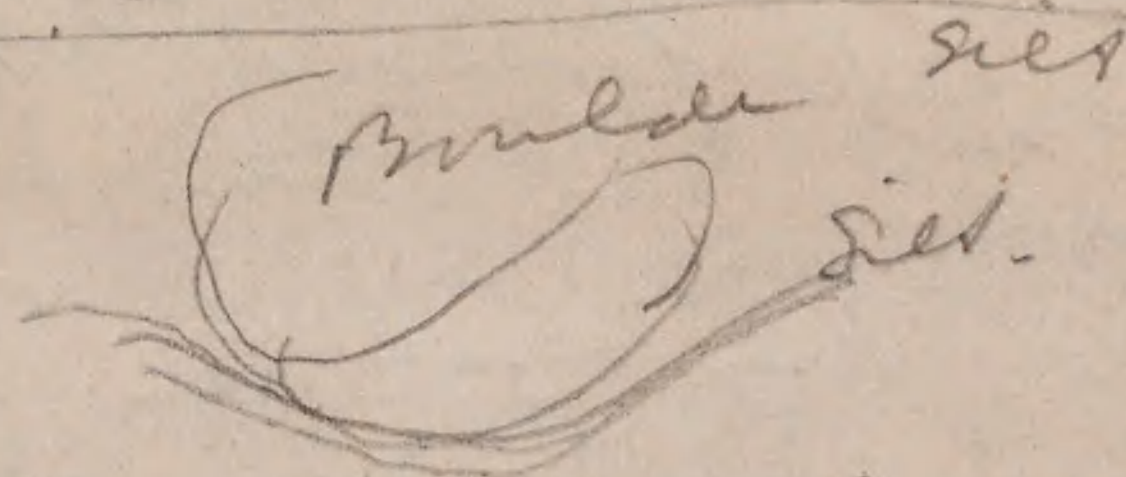
The lower sand which I marked Aftonian is first mixed & inter-banded with Kansan in some places.

The fine sand on the Kansan is very different, fine &

laminated & not ferruginous, 43
in rags in shale to south the Aftonian is 2 or 3 ft. thick, very ferruginous.

The sand (upper) in some places comes right to the Aftonian gravel, but a large layer of gravel (2 ft.) lies just above thin silt which rests on Aftonian ferruginous gravel.

This silt has value of Sphaerium in it. - Silt 2-3 in thick



By digging back at boulder I found a thin layer of ^{what appears to be} calcareous Kansan. But it is a mixture of Aftonian silt & boulder. The silt bed is 2 or 3 ft thick. Laterally it is mixed in places with sand.

The lower sand grade together
by interlamination.
There are coarser grains
of sand in lines - as if water,
but I have seen just
such segregation of coarser
sand by wind on dunes in
Minnesota as at Dane Park.

At extreme S. end of cut 15
(beyond my figure) there
is even above sand
(laminae below that) &
then a bed of reddish stuff
(I call it Nebraska) &
that, then shale.

A line of boulders &
some sand & gravel
appear just above.

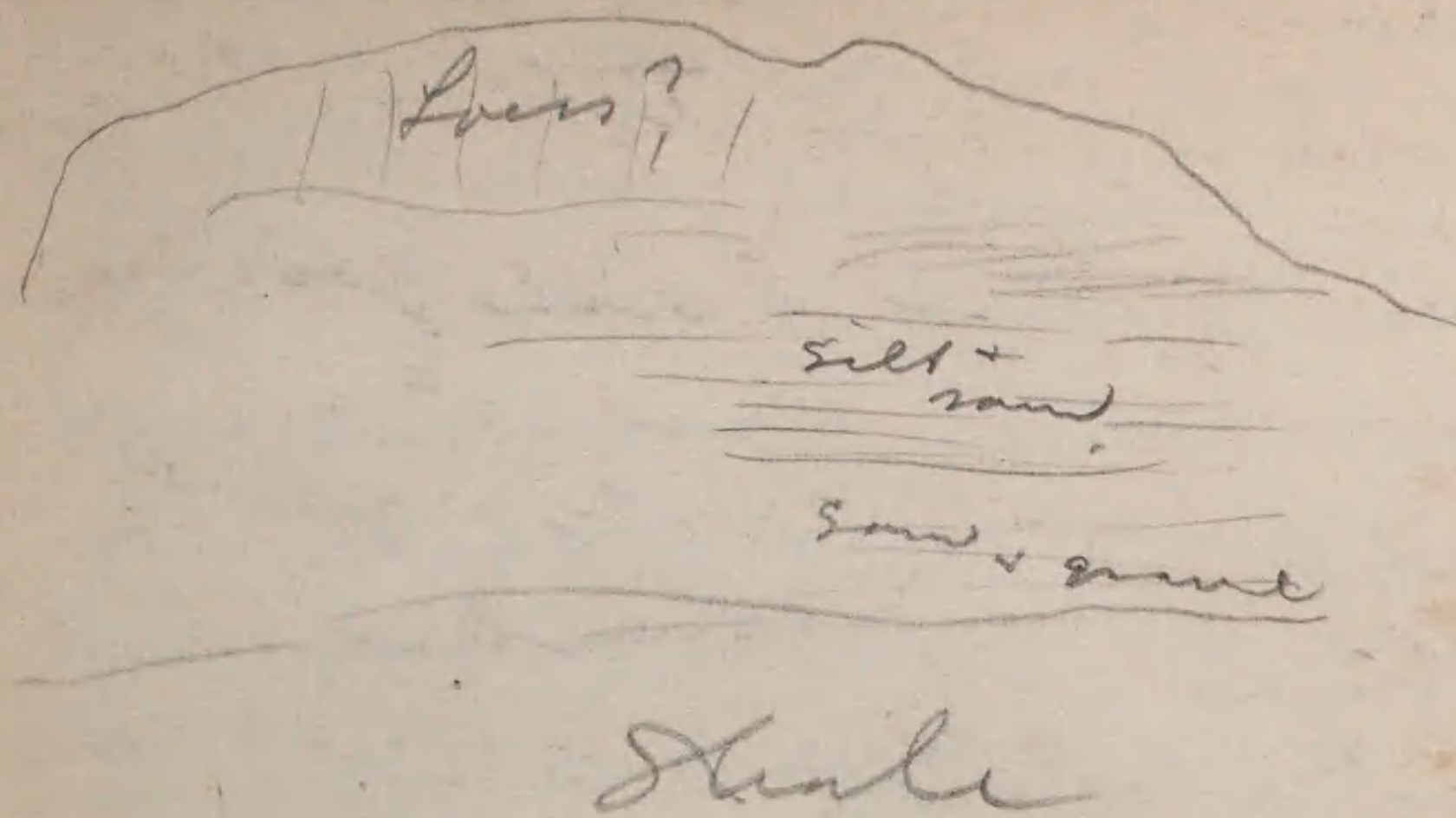
A rocky spring also
comes out at this place.

The boulders & pebbles
may be Kansan, more
likely Aftonian, or they
may belong to Nebraska but
I could see none in it.

(See sample of "Nebraska" 45
In the S. end of cut 16 - shale
shows at about same level.
Then a bed of sand (lower
part coarse, ferruginous, with
pebbles & some boulders.
It rests on a blue shaly stuff
(a red band of it at top) - see
sample. Cretaceous shale, but
very like what I have seen
up the river.

The lower part of the sand
is decidedly Aftonian, but
upper part shows interlamination
with silt (like above Fairview?)
& some of this silt appears in
lower divided Aftonian.
Upward it runs into a sandy
silt - & upward into loess(?)

The laminated part here appears
to have been laid in water.



Cut 16

At cut 17 RR now
read 1150

At N. end of cut shale
at road level - 20 ft above
Mc
then about 2 ft. of
very ferruginous sand &
gravel.
then Kansan.

A clear case of Aftonian.
To right loess appears
above Kansan.

47
Member center of cut the Kansan
is very sharp, typically bluish,
jointing, brown, with pebbles
boulders & somewhat calcareous,
& with small boulders marking
upper line somewhat.
On this rests probably 25 ft.
of what appears to be yellow
loess all the way up.
Breaks into columns, has
vertical face, & below it
shows only trace of sand right
next to Kansan.

6 or 7 ft. of Kansan exposed.
Below is dump, - talus.
But at S. end the lower
part is distinctly sandy, interstratified
with silt as before. At least
5 or 6 ft. shown & then less.
Below it clearly rests on
Kansan, - no doubt of that.

Photos 19 & 20
cut 17-

Loess

Kansan

The bluffs between Akron
& Chatsworth are just the
ordinary low, rounded Kansan
topography hills which
extend back eastward as far
as I could see from the hill tops.
On the So. Dakota side the
hills run close to the river
all along, and are similar
but perhaps rather more
abrupt.

Put up at New Kendall Hotel.
cold!

Sep. 9 (Friday) 1910. 49.

Left Akron at 8:00 am. for
Watfield.

Barometer (as set yesterday) reads
10.35 at Akron depot this morning.
Cut 7 is a small sand + gravel
pit. its top 25 ft. above bottom,
on which RR runs.

Its upper part is mixed, very
calcareous, some boulders.

It has cross-bedded sand.
Evidently Kansan on hill above,
only 4-5 feet exposed.

Cut 8- is just in turn of road. It
shows 6-8 ft. of shelly stuff, but
it looks more or less mixed & very
calcareous in places.

It is evidently calcareous stuff.

The bluffs below the turn
in road become higher, rougher,
& more calc. stuffy. There is evidently
much more loess piled up on
them.

At 9 shale shows at top of
ridge not less than 50 ft.
above bottom.

Went up into sec. 18

The shingles here are at 1175.
There seem to be shingles
at about this level on
both sides of the Dry Run
valley.

There are at least 3 shingles
on slope above (N.E.) of house.
Shale crops out below, then
Kansan drift appears, & level
tops hills.

Mr. Coleman says he bored into
spring & after getting through
"yellow clay" (evidently Kansan)
he strikes sand & gravel.
(sand & gravel)
He says they break out on

surface occasionally
creek bottoms near 1105

Patrick Coleman.

cut 10

In the Coleman pit on sec. 13
saw run up to 1185 ft.

The upper layer has coarse
material & some large boulders.
Sander below.

In upper part rotten granite
boulders.

In other pocket (NW) loess
shows above. Saw there is
at about 1165.

The main sand pit is just on a
level with a pocket on S. side
of creek valley which also
looks like a sand pit. ^{this is} Butcher's pit
in sec 28.
It is also about level of shingles
on S. side.

Some of the boulders (granite,
S. Q., etc) measure 4-5 ft.
This is in Sioux Twp.

Road (main) a bottom road
1050

Reading at base of Travis
pit = 1250

The Tracy - pit (cut 12)
is located in the southwest
1/4 of sec. 19 - on a slope
looking NW. About 4 or 5
ft. are exposed. It

runs rather coarse sand
with small pebbles & a
few small boulders.

The sand & gravel runs
to surface on slope, but
above it there is distinct
Kansan & above that
loam.

A gray silt layer - 2 or 3 in.
appears in base of sand
below it again, - did not
reach bottom.

About 8 rods further S. there
is another pit - its
top also 1230.

On top is Kansan -
distinct & thin layer.

This runs at least 8 ft.
to a conglomerate layer

53
on which water appears. Does
not go further.

On slopes S. gravel crops out
all along.

Still further south rocky places
appear at about level of base
(or below top sufficiently to indicate
base) of sand & gravel.

Photos 25 & 26 Looking up

branch (& across main) valley of
Joy (French) creek Looking S.E.

Top of high knob = $\frac{1415}{1050}$
365

Photos 23 & 24

Looking N. from a point E. of
J. Tracy's house.

cut The base of exposure in Butcher
pit is 1300

The upper 6 ft. is calcareous,
thirsty mass of Kansan with
rotten boulders, sand boulders
& boulders of petrification(!)

The lower line is abrupt
but irregular.

Boulders & pebbles are abundant in Kansan. The sand is cross-bedded & about 8 ft exposed is light colored, little oxidized. The Nebraska(?) boulders are very abundant.

Took two samples of Nebraska(?) boulders.

From this side the column pit looks a little lower than Butcher pit.

Coarser ferruginous gravel appears lower down in a gutter (10-12 ft. below top of gravel)

Last reading
Top of bluish pit E. of Tracy's
= 1430

At 1265 ft going down there is (E. of Tracy's in

55
determining) a spring coming out of sand layer - Kansan in boulders above. Sand in boulders rises at least 10 ft. higher. This seems to rest directly on a bluish shale. The shale is 78 ft. higher than spring.

Top of shale reads 1275.

Diagram showing a cross-section of the ground. A horizontal line represents the surface. Below it, a layer is labeled "Sand & gravel". Below that, a layer is labeled "Shale". A spring is indicated by a small circle with a line pointing upwards, labeled "Spring".

Top of shale cliff N. of Tracy's home = 1250.

This is at old quarry. Above this, up slope, at 1270 there is a little pit open - ferruginous sand. This is probably near top of Kansan

appears immediately above, & gravel,
is seen on slope below.

Road on bottomland at foot
of hills near 1145

1430

1145

285

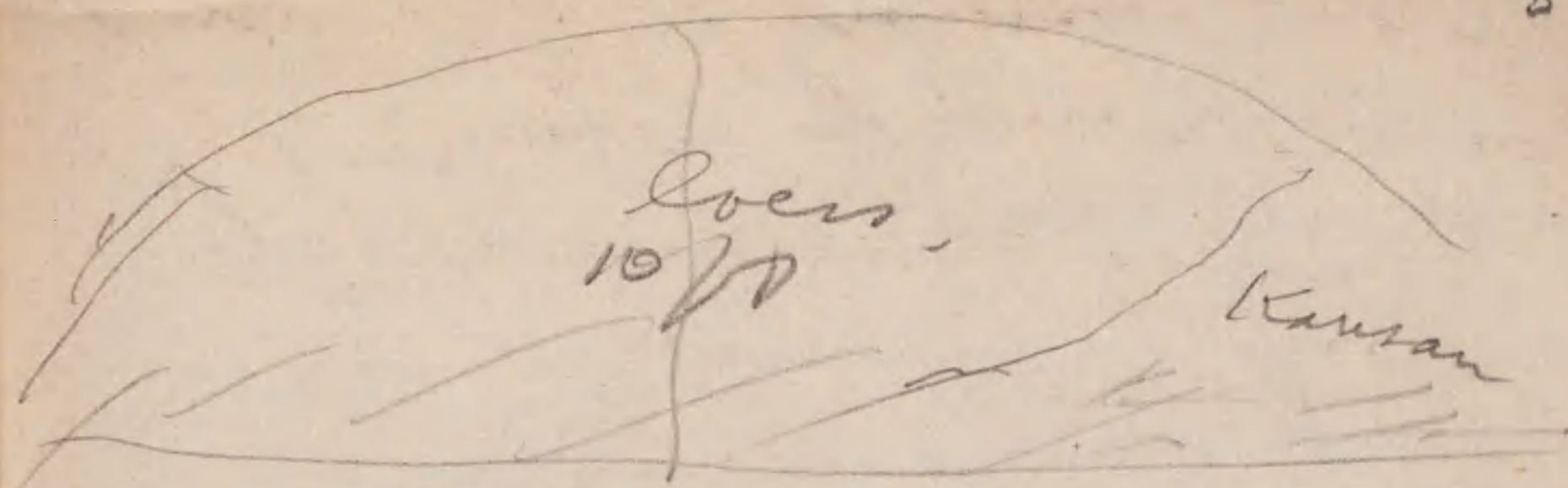
The highest hill is at least
20 ft. higher.

Cut 14 is an old slumped
sand pit part way up slope
just S. of Rock creek.

There are mounds on all the
high points near Tracy's.
I saw shells, fragments of
bones, flint-chips & pebbles.

Along road S. of Rock creek
Kansan appears in banks.
Also, in darker soil along
glau hills. At a point
 $\frac{1}{4}$ mi. S. of cut 14 loess &
Kansan appear in banks along
road (on E. side) thus:

57



The bluff on the N. side of the
Broken Kettle cr. valley are
more abrupt & cat-steps
while those on S.E. side are
rounded, & scarcely show cat-steps.
Barometer near 1170 on bottom
near mouth of Broken Kettle creek.

Cut 15

Road 1225

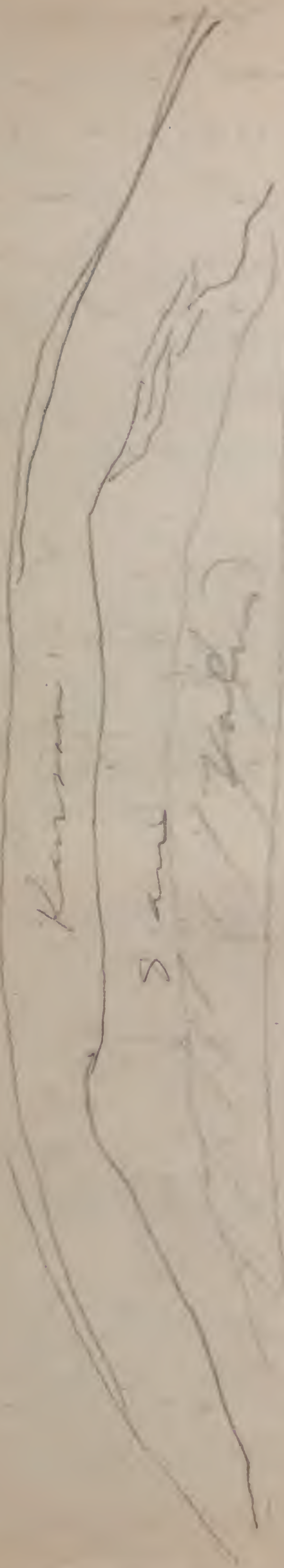
Top of sand in pit 1295.

This shows 4-5 ft. of typical
yellow, bluish calcareous
Kansan, with pebbles &
sand boulders.

A sharp line, oxidized, separates
the two.

The sand is slightly brownish,
cross-bedded, & part coarser

cross / b



above the Kansan, up the slope,
yellow low cone hill, - east slope,
all the territory toward Sioux City is
limestone. This is the earliest territory.

At 1250 ft., highest pt.⁵⁹
in road next to river (S. side)
there is much gravel in road.
Cliffs of cretaceous show
plainly (even where covered)
along bluffs S. of big turn
in road.

Returned (cold driving!) to
Westfield & stopped at
West Hotel for the night.

The river topography, as prominent toward Sioux City
is distinct up to big turn in road, & then gradually
disappears northward.

Sep. 10 - (Saturday) 1910

Left for Sioux City at 8:10 am.
Reading at depot at Westfield this
morning = 1425.
In high bluff toward upper end
(^{upper} Mather's Bridge) coming into
Sioux City I saw Rowland
high up in the bluff.
Landed at Sioux City at 10 am.
Visited Mr. Healy, got mail,
purchased plates, etc.

In afternoon went out to
North Riverite.

At strong point - just at bend of
Big Sioux river readings were as
follows:

River level - 1200
Road - 1220.

Top of shale in bluff 1300

Loess - (top of) - 1335.

The loess rests directly
on the shale here, except
that there is a heavy layer
(probably Loveland, but yellow)

about 1 ft. thick, grading into loess.

Great clouds of dust rise from
bars of Wisconsin in distance.

Top of highest point above (+
8.0) cliff = 1425

In Talbot's:

creek bottom = 1285

Top of calcareous shale = 1395

Top of loess hill N.W. of Talbot's

home = 1495

Top of next rise 1515

61
Top of sand in Talbot's pit -
1415

At top of exposure there
are large boulders, - granite, S.S.,
Q. etc.

The bank is here dumped some
or less but above the sand - up
4 or 5 ft., I could see pebbles
with calcareous joint clay.

This is clearly Kansan.

The sand in the pit is sharp,
ferruginous.

The lower limit could not
be made out, but the sand
can be found at least 20 or
25 ft. down. There is shingle.

Miss Ruth Richetts

Melhuot Farm

Box 143

Sioux City, Ia.

There are other pits to S.

Mr. Hardy has a pit near N. River
(N. of Voluntary Row)

At 1365 on opp. side
of ravine a spring comes
out - above it for
at least 6 ft sand
& gravel are visible
in bank.

Several springs come out
on the W. side (below pit)
one in bottom from a
great mass of boulders, etc.
These are nearly at
same level as the
spring on E. side (one
which supplies house)

On E. side above these
great bouldery springs
there is sand (ferrous
like on W. side)

The spring & sand pit
are just N. of Plymouth

co. line

creek bottom at foot
(where house was tied) is
1300.

On return - road of Story
Pt. road 1275.

Took a lot of pictures from
top of Talbot hills
N. of home

21, 22, 23, 24, 33, 34, 15, 16, 25, 26, 27, 28, 29, 30, 31, 32, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

Was out with Mr. White
(summer session) principal of
one of the schools.

Sept. 11 - (Sunday) 1910

Reached Sargent's Bluff at 6 AM
Set barometer at 1000 ft.

at RR. at depot.

Exposure at point near RR
shows a dark shale (clay)
below & soft sandstone on
top - forming ledges.

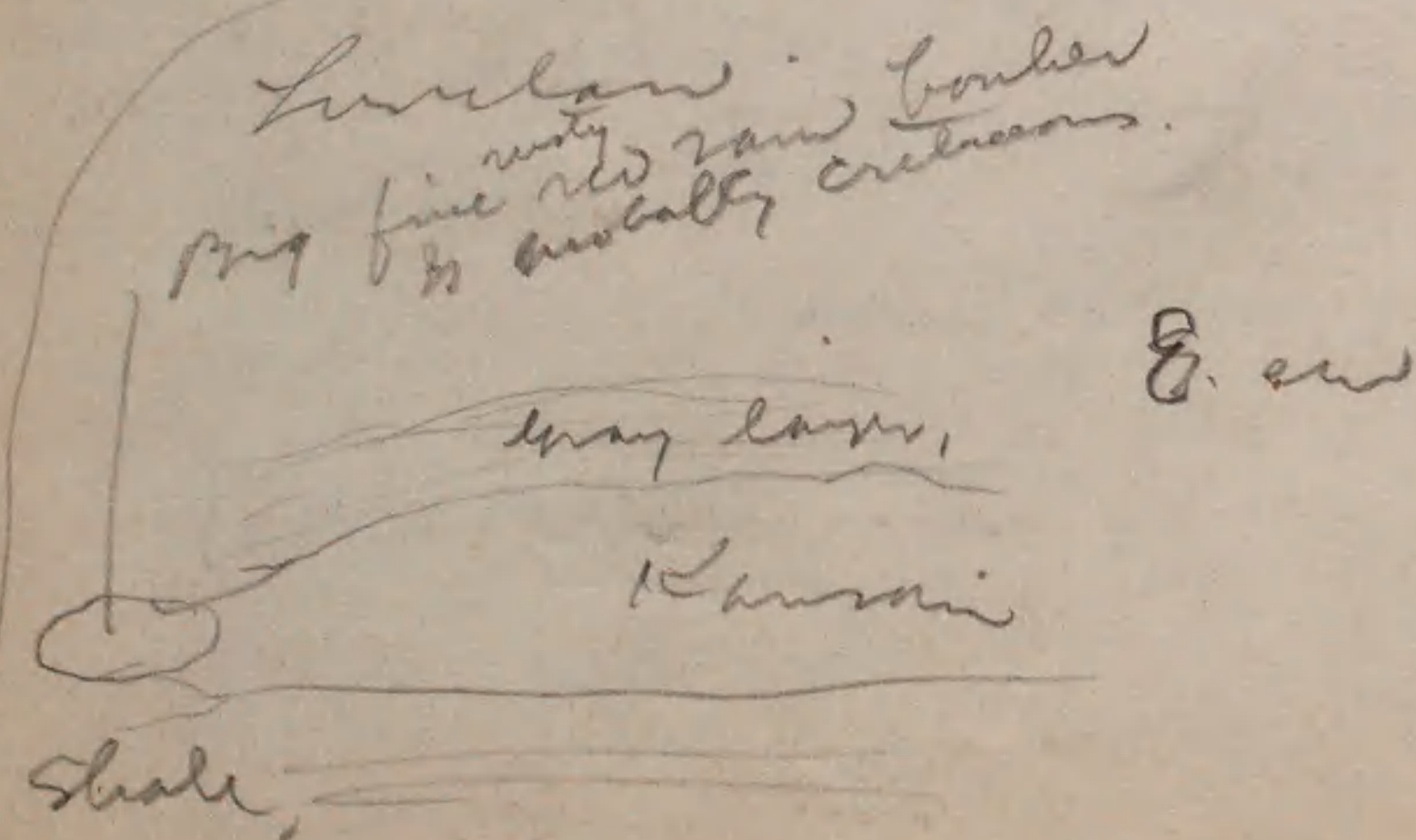
The top of ledges = 1045.

A little further S. (arrow point)
shale (brownish) shows up &
1045.

Above it are 3-4 ft. of

Kansan & then 5-8 ft.

of Loveland, Loam on hill.



at W. end of the exposure on 65
S. side the Loveland rests directly
on shale.

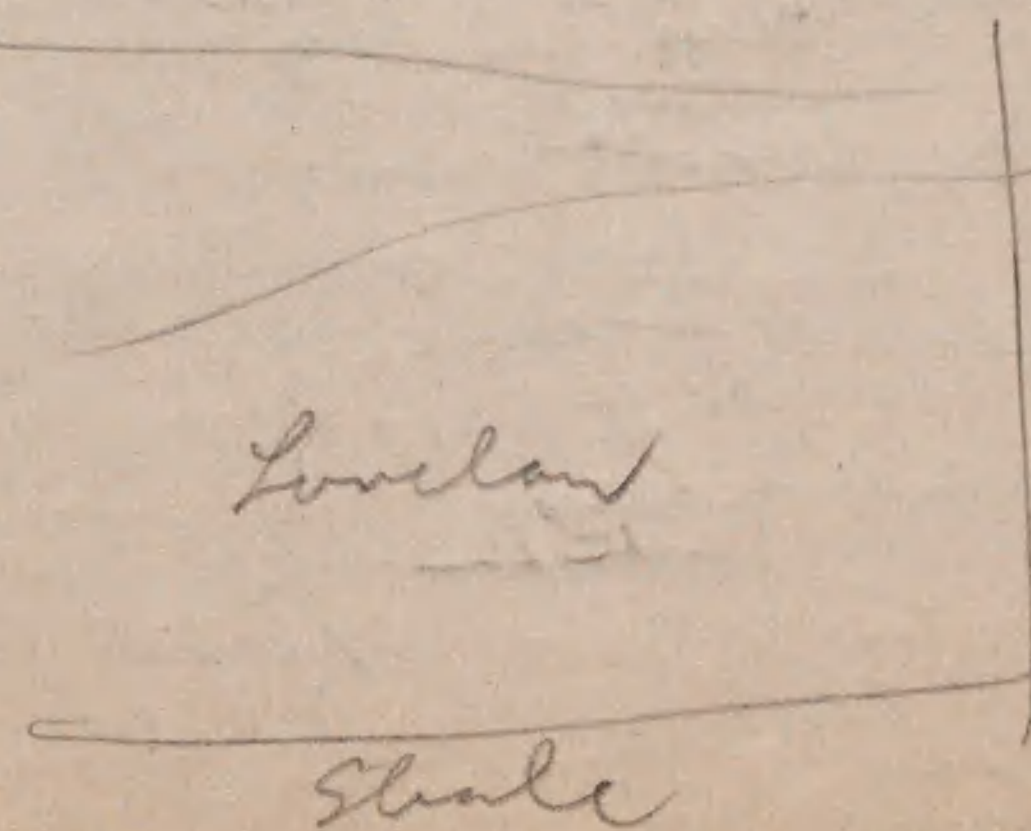
There is a layer of clayey shale
(clay) on top 2-3 ft thick.

Then comes sandstone, 2 ft. or
more thick, then blue shale.

Up to 1080 there is a
pebbly hard clay (probably
Loveland) with many calcareous
nodules on surface.

Then to top, 1110, it is soft
yellow loam.

This however is by no means
the highest point.



Top of highest peak in this
lot is 1180. (near center)
Top of next (NW) is 1160.
Lowest bottomland (where
road strikes bottom) N.E.
was 975

At cross road W.R. it is 970

In sec. 17 at x the well of
L. E. Wilcox

shows 60 ft. of just yellow
clay. No sand or gravel.

The next well north (in W.R.)
went 80 ft. with same
result.

Top of highest part of ridge
between — is 120 ft above
bottom at school.

Mr. Wilcox says there are no
gravel pits this side of
Argents Bluff.

Reading at top of highest cliff¹⁷
S of Floyd monument = 1060
Bottom (nearly on level with RR) = 930
Base of Floyd monument (on
cement base) 1010 ft.
Shaft built of sandstone blocks.

Corner stone of shaft on N.E. corner,
on S. side this bears inscription cast
into stone:
N. M. Chittenden
captain Corps of Engineers, U.S.A.
Engineer and architect.

On N. side it reads:

August 20, A.D. 1900

Madison B. Davis, Commander.

Department of Iowa.

Brown Army of the Republic.

Brass plates are on E., S. & W.
sides. The east one reads:

In commemoration

of the
Louisiana Purchase
made during the

Administration of Thomas Jefferson
Third President of the United States

April 30 1803 —

of its successful exploration
by the heroic members of the
Lewis and Clark Expedition
Valor of the ^{the} American Soldiers
(see next page)

and of the enterprising
courage and fortitude of the
American Pioneer
to whom these great states
west of the Mississippi River
owe their foundation.

On S. side (small tablet)
John Herr Charles
President
Floyd Memorial Association
1875-1904.
But for his persistent efforts
we should not have had this monument.

W. side.
(Floyd)
This shaft
marks the burial place of
Sergeant Charles Floyd.
a member of the
Lewis and Clark Expedition.
He died in this country's service
and was buried near this spot.
August 20 1804

Graves of such men are fitting shrines
shrines to no class or creed confined.

Erected A.D. 1900
by the
Floyd Memorial Association
aided by the United States
and the State of Iowa.

RR at base 920 ft. 69
Probably 40 ft. above river.

River is 880
Rock is exposed down near
water level (exposed from
landslide.) Some is shale.
The high banks above are
heavy joint clay below,
loam above.

At S. end line very sharp,
in loam dump? - Soil runs
along joint clay under loam.

The great mass above RR,
as shown in several large
cuts above Floyd monument
(up the river), seems to be
yellow loam, though the lower
part is very hard & evidently
Loveland.

Sept 12 (Monday) 1910

Left at 6:25 am. for Hornick.
Drove N.W. through West Fork &
gravel pits. The bluffs all
along are abrupt, calcareous, typical
loess wind bluffs.

Along road in sec. 25, Gravel pit.
gravel shows more or less in road
in the knolls

At road. Bottom below

Snyder's sand pit, reading = 1035

The Snyder pit is located in
bluff E. of road, & its top
(of sand) reads 1095.

I find Kansan at & above
1095 in bluff (just E. of pit)

There are boulders & cobbles in
narrow band at top of sand
& above that 15 or 20 ft. of
yellow loess

A little Kansan is also visible
just above sand (some boulder
layer) in pit.

Pieces of sand-plates are
washed out

This is in N.W. 1/4 sec 23.

This has all slumber here
more or less, but this is
clearly Aftonian sand with

Kansan & loess above.

The base where they have
worked is about 25 ft. below
top of sand, & this probably
represents depth.

This is the sand pit of this part.
Large sand plates are thrown out.
This has evidently not been
worked for some time.

The Sargison pit, farther
up, is a coarse, mixed
gravel pit in side of hill.

The lower Snyder pit is on the
west side of the road in the
S.W. 1/4 of sec. 31, West Fork.

It runs up to road. The reading
in the road is 1080.

The material is called coarse
feruginous gravel, with a ~~good~~ ^{few}
small boulders.

About 8 ft. irregularly exposed.
This is the usual bench. Loess on hill.

An old pit had also been
worked above the road a little
farther up, - but probably
ran out afterward.

Found *Silphium laciniatum*
with root 6 ft. long, perfectly
vertical, in gravel pit. The
end had been cut off.

Bottom at Holly Springs 1030

Top of sand in Hurd pit =
1000.

Base as far as I could make
out, 1086.

3-4 ft of distinct calcareous, gray,
ferruginous. Tannin Kansan,
with few pebbles rests
on a silty-sandy part of
Aftonian & Kansan is very
calcareous (nodules) near
line
Runs on hill above.

Lower down a ferruginous gravel,
mixed & irregularly stratified, is
worked for the gravel.

73
This is said to be one of the oldest
pits in this part.

Westward a small pit shows nice
cross-bedded sand & gravel under
a mixed top layer.

Kansan is clearly above it all
along here.

There is quite an extensive terrace
on the W. side of West Fork which
seems to be about on a level
with the Aftonian of this pit.
The Territory between Holly Springs
& the Hurd pit is very rolling
over Kansan, & the numerous cuts
along the road show yellow loess,
nodular above & (less rounded)
nodules below.

The 6th cut N. of Holly Springs (2nd mile
2nd mile N) shows yellow loess with
scattered joints. (See box.)

The 1st cut N. (just N. of cross-rows)
shows lamination below.

Drove E. & S.E. from Holly Springs.

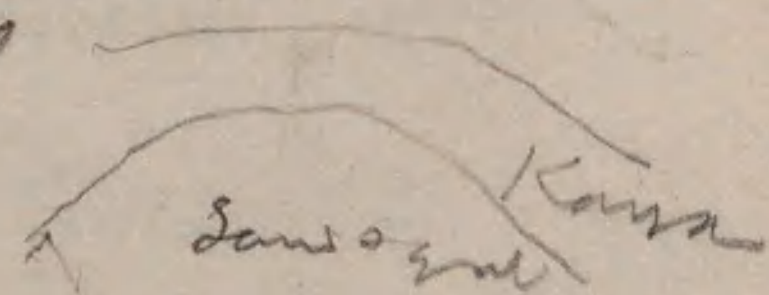
The Eggers pit is at a height of 1105 (top of sand). It shows about 6 ft. of fine sand. Could

not see Kansan on this slope, but loc. rises 40 or 50 ft. higher.

Bottom still reads 1030.

This sand does not have an aptesian aspect, but may be such sand as lies on Kansan farther north.

Kansan shows well in road. On sec. 24 at (X) there is a bank cut by creek (on S. side) showing greenish sand & gravel with Kansan above it.



The gravel in the finest upper part of the Beebe pit is mixed (of the usual dirty type). It is here at the surface & has probably been exposed a long time. Is that all this gravel means in any case?

75
The Beebe pit is located in the SW 1/4 of sec. 24, Willow Twp. It comes down almost to the level of the road.

Gravel shows along road (in bank) between small creek to N. & this pit.

Top of gravel in pit = 1105

about 9 ft is exposed including the upper part has a silty layer - & sand 2-3 ft.

Then comes sand & gravel 4-5 ft. Then fine sand, etc. The upper part of sand is mixed. Cross-bedding clear.

This is good aptesian.

No Kansan immediately above, but a lot of Loveland (& above it) shows on hillside above.

Conglomerate plate - strong - at a depth of 7 ft.

There are boulders (few & small) of Kansan drift in upper part, (2 or 3 ft.)

Up above the sand run
to 1115 & has distinct
~~reddish~~ ~~Kansas~~ above sand
~~lowland~~ above ~~that~~ & lower
above that)

This shows the relation well.
Photos 25, 26 & 27, 28 (bracket
lens out) looking S. at
very rough lower hills S.
of Beebe's pit.

The narrow bench along here
seems to be sand & gravel
chiefly.

One of the finest portions of
the bluffs for the "Sierra
effect" is that within the east
 $\frac{1}{2}$ mile to the county line.

The barometer seemed to be
very constant today, repeated
checks showing this.

Returned to Hornick & left at
5.55 PM. for Rodney.

Put up at the Arlington hotel.

Sep. 13, (Tues.) 1918⁷⁷

In looking out to the S.W. this
morning from Rodney towards the
bluffs on the E. side of the little
river I can see that the
higher, ~~rounder~~ & more exposed slopes
and peaks are brown, the remainder
still being green.
Started out up the E. side of the
valley of that river.

The first cut N.E. of Rodney on
the C. M. & St. P., in sec. 31-86-43,
is about 15 ft. deep and all yellow
loam, nodular above.

The second cut is much larger,
fully 30 ft. deep, and as far as I
could see (in gullies cut nearly to base)
is yellow loam, more compact below, &
nodular above. The RR. here runs

about 1035

Up to the Monona co. line the bluffs
are abrupt, rough, wind topped.

Beyond that they recede & are lower.

Along in sec. 19 & northward a broad
bench, loam-covered, appears. It is more
or less broken in surface, but is

is a distinct bench. The hills
rise back from it gradually.

In the SE. 1/4 sec. 18-86-43 - S. of Os.
The road leading E. (sec.) cuts into yellow
loess (one trial.)

This is at the edge of the bench.
The bench runs 40 to 50 ft.
above the valley.

Near base of bench at (x) east
of this cut sand, capped with a
thin layer of small boulders &
coarse pebbles is exposed for
about 4 ft. in the bank on S. side.
This is near foot of slope, 8-10 ft.
above bottom.

The sand is clean, cross-bedded
& looks like good Aftonian.

This is capped above with
a thick deposit of loess (yellow
as far as I saw).

^{July}
Mr. Oregon -

79

This well at old house in sec. 19 (near
turn) went through soft yellow
clay to a depth of 64 ft.
where it struck sand & gravel &
some stones.

He says all the sand is too fine.
He first went through some clay
mixed with sand.

At the owner's place near S.W. corner
of sec. 17, he went through a whitish
yellow hardpan with pebbles
scattered in it, - at present
well about 2 ft (it was
thicker nearer the house, &
runs out down hill) (the well
is rather low on slope).

Then common ^{yellow} clay - about 9 ft.
Then about 3 ft. of sand & gravel,
well is now 14 ft. deep.
First coarse gravel, then
rock (boulders - from first size
to water bucket).

The new house is in NW. cor. sec. 17.
rather low down on slope. Opposite it

on W. side of road & farther up
the edge of the bench, extending
to its top, is a deep gutter
exposing fully 20 ft. of loess.
This loess is yellow, but below
it becomes quite bluish, streaked
with ferruginous, & is compact.
This bench is evidently old.

The hard pan & yellow clay are
probably both Kansan, though
the latter may be Aftonian
milt.

The bench ends abruptly at
the river house.

The bluffs above are a little
more abrupt, & Kansan appears
in the bank. N. line of sec. 17, at 2
near ~~east part of sec. 8 at 2~~,
reading 1015, sand appears
on the east side in a little
road cut, & Kansan is
distinctly above it.
~~It appears to contain pebbles~~
~~& a few small boulders.~~ ^{Probably} Kansan.

81
Cut 4 is also along road on E. side,
(reading about 1000 to top of sand)
It shows 3-4 ft. of sand under
Kansan. The sand is quite
ferruginous, especially along
line below Kansan.
The next 3 or 4 little knolls along
road N. (S. of first cross-roads in sec. 8,
cut a little by road also show
gravel.

In sec. 5, Old Top. all along
slope there is typical Kansan, with
some good-sized boulders.

toward W. end sand often in road with
Kansan in the bank, - at a

A broken bench occupies the angle.
Bottom opposite Old reads 960.

In S. part of sec. 32, Miller Top.
fine sand appears on log slope.
It comes from under loess &
is probably dune sand.

In the NW. 1/4 of sec. 32 Miller
Top. the road runs down a
long hill. Loess appears above.
At an altitude of 1015 there
is very rusty sand with Kansan
above it.

Lower down gravel appears.
Kansan also shows on lower slopes - pushed
over.

Bottom here reads 970
At an altitude of 1030
a very hard red bubbly
joint clay (looks like part
Loreland) lies over sand &
loam above that.

This (1030) is top of sand.
Gravel appears at 1018

The sand seems to slope
down hill. It probably
runs out and the mass
of Kansan appears below.
The gravelly layer is only
a band with sand under it.
Most of the sand is very
ferruginous, especially up
the slope.

At about 1010 a fine
gray laminated silt appears
below gravel & sand & is
interlaminated somewhat with
them. I dug into it about
1 foot. This is like of

gray silt at Soo Falls. ^(see 83)
Below this on slope appears
a till which I would have
called Kansan. It is ~~gray~~
weathers gray like Kansan, but
is very tough. It is very
limy. ~~It is not like the~~
~~silt~~ (see sample)

This is just like material under
granite at Granite, -
probably a phase of Lubbock.

The E. side of the road shows
no sand & the heavy red
(Loreland like) stuff may be
continuation of Kansan.

The loam runs down into
a redder Loreland like layer
above sand however, on the W. side.

This lower stuff weathers into
exactly the same grayish limy
stuff found below gravel at Granite.
Saw a sand boulder in this lower
loam.

Ordinarily I certainly would have
called the lower material Kansan.

In sec. 29 northwest every
little knoll crossed shows gravel
small boulders & sand.
In the NW. cor. of sec. 20, S. of my
road, a bed of small boulders appears
long down.
Some of pebbles are abundant all
along the road, on every rise.

Reading at Anthra (1. pm) = 1020
on str.

The lowest bottom is 1005.

Anthra is built on a
terrace of gravel & sand.

At edge east toward river bridge
it shows a mixed boulders & pebbly
layer above, & more or less cemented
(calcareous?) sand & gravel (with some
boulders) a little below top.
Only about 3 ft. exposure.

Some 500 ft., rotten boulders of
granite, ferruginous bands &
clouding, etc. show.

It seems that this terrace is
a little higher at E. edge
(reads 1025) & drops off westward
gradually. Surface shows it.
The hotel man says it is a

gravel ridge ending a little 85
below Anthra & running back
to Cherokee canyon.
All the sandpits here & north are
in this terrace.
The RR runs ^{up} into this terrace at
Anthra.

The Mahanoy pit (gravel) is
located at N. edge of this terrace
(there is a sandpit at S. edge)

At least 12 ft is shown

2+ ft dark jointed soil.

Then a thicker layer of mixed
gravel (looks partly cemented)
about 1-2 ft.

Then at least 9 ft of
beautifully cross-bedded gravel,
coarse sand & a few boulders.
The cross-bedding is not oblique,
mostly nearly horizontal.

Bottom of pit (about = lowest bottom)

reads 1000

Top of exposure = 1015-

The Harnoll sand pit is at
S. edge of town (v terrace)
It has the top joint soil (2 or 3 ft)
then 4-6 ft mixed gravel &
small boulders & below that
about 7 ft. of clean sand very
nicely horizontally stratified.

Along W. side of sec. 5
S. of center there is a
long exposure (5-6 ft deep)
showing a heavy yellow
silty (?) stuff with many
small nodules. Below 6 ft
it becomes chocolate.

This is up above bottom.
(at 1075) It is somewhat
loose like, but too heavy.

Sand appears (it probably
belongs below this layer)

anyhow there is a very fine
line between this & the chocolate
layer.

At school house the bank
seems to consist of Loveland (reddish)
only 3 or 4 ft high.

In sec. 7 - there is a gravel
pit (H. J. Hiller pit). - Old pit - 30 yds
Base of exposure about 1045.
8 or 10 ft irregularly exposed.

Small boulders scattered all
through. Below there is fine sand.
There are springs in hills.

The upper coarser material
is mixed pebbles, coarse sand, etc.
It also contains a few Kansan
tile "boulders" in upper part.

Above this in the hill (a gutter
cuts in) strong and distinct
an typical Kansan, bluish, jointed,
with few pebbles & quite calcareous.
This is certainly Kansan &
the gravel is below it!

The gravel is below it!
The top of gravel (as nearly
as I could make out reads 1055.
This is in main hill facing

5' The nice fine sand begins about
10 ft. below top of gravel.

Mr. Hiller says he has found
clam shells but no bones or teeth.
Another gutter S. shows clear Kansan.
Loess is on hill.

Some of the upper sand & gravel
is very ferruginous.

Kansan shows all along bluffs S.
Sand & gravel (mostly very
ferruginous) also show in several
places — rather low down
(evidently under Kansan).

In the pit in sec. 13. up
a.k. Guthridge
to 1035 a very regularly
stratified sand run.

The stripping above shows
15 ft. of typical bluish,
red-streaked Kansan with
few pebbles & some lime.

At 1010 there is a sharply
set of gray silty layer
with nodules. (see sample)

This crumbles almost like
ashes. I placed fine-joints.
at least 6 ft. exposed.

All along S. where road crosses
low thin whitish layer is exposed
& at lowest point at least 18
ft. exposed, with fine sand
under it at very base of

bank here on lowest river bottom ⁸⁹

Reating at base = 1000.
Some of the upper part is here
sandy.

In SE $\frac{1}{4}$ of same section
another pit — sand & gravel.
(sand & stone)

Belongs to A. H. Fisher.

Finer sand than in Guthridge
The Fisher pit is higher than
Guthridge pit.

under gravel there is a hard
layer.

Another pit in SE $\frac{1}{4}$ same sec.
this is Walling pit.

The coarse mixed bouldery
gravel runs up to 1100.

The pit has 20 ft exposed
The upper part has strata
of the gray silty mixed with
pebbles. — limy.

The ferruginous (very) sand
begins 4 to 5 below top.

The material is well cross-bedded
& there are here & there
streaks of mud.

The sand is mostly ferruginous
but there are gray belts
below.

no bones or teeth found,
In uppermost part there are
drift "boulders".
This is a large pit -
the mixed gravel runs to
top of section.

Near Oto Kansan is
frequent in road.

The "silt bank" in sec. 6
just above Oto shows upper
stuff like Kansan (but no
pebbles), then a thin layer
of rusty sand, then gray
silt 4-5 in. & thin

2 or 3 ft. of very dark
silt-like hard stuff.

In sec. 12 N. of Smithland, at
highest pt. in road there
is an excavation 6 ft deep

on W. side showing flint & 91
two to three inch - big rusty
sand boulders.

The road reads 1190
Hills beyond rise probably
50 ft. higher.

South of this & much lower, a
cut & deep gutter on W. side
expose loess (?) above running
down into Kansan like silt,
same as before & as S. of
section.

In NW 1/4 13 - E. of creek - N. of
Smithland there is a deep
cut showing 18 or 20 ft of loess
(compact & redder below (some loess?))
& Kansan shows below it lower
down a W. slope.

Sep. 14 (Wednesday) 1910

Drove from Minner Valley to
Cox & to Kovelars.

The material excavated from
box cut off E. of Minner Valley
is like the Kansan joint clay
(bluish, calcareous) but with
scant pebbles.

Visited Cox pit. Cox has bone
of pachyderm skull, showing foramen,
& wants to keep it until co. fair time
(over Sep. 30). Secured several small
bones & a mastodon tooth.

Collected flowers in bottom &
S.E. along base of bluffs.

Drove south, & returned to
go up hill (S. side) after plants.

Visited J. Hoffman at the cement
works who has 3 plates (cemented
together) of an elephant's tooth.

Wondered past with it. He evidently
thinks there is a fortune tied up
in it.

Also received (from the undertaker)
a fine tooth which bears all
the Aftonian ear-marks. It is

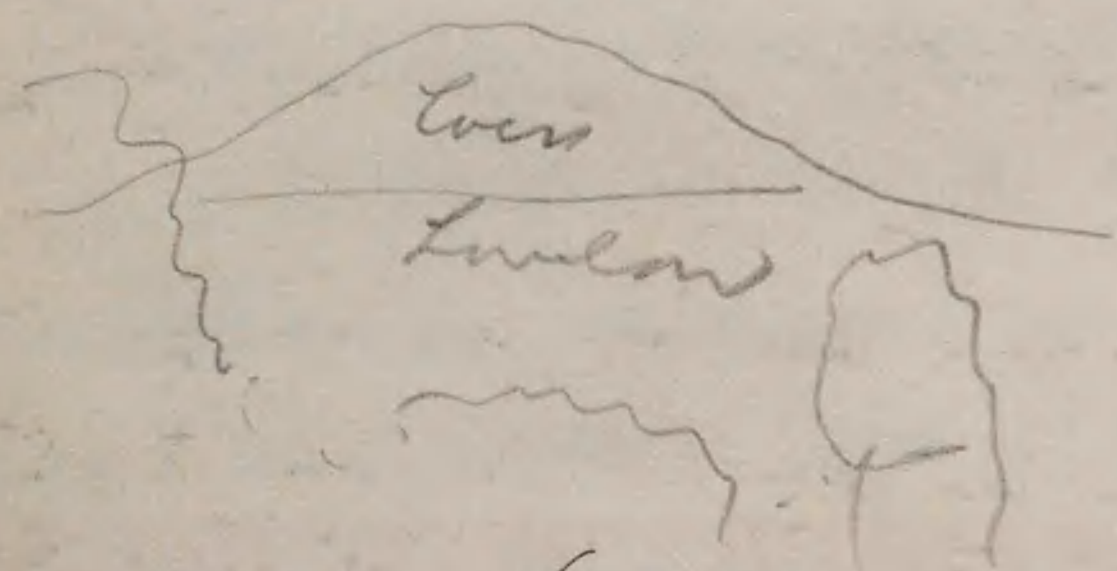
It is evidently Mammuth 93
mirificum; & was found in the
belongings of a young man who
worked here for a short time
in the D.R. shops, & who committed
suicide some months ago at Newfine's
house.

Left Minner Valley at 2:15 p.m. for
Council Bluffs.

Sep. 15, 1910 (Thursday)

Went south toward Bellevue
on Omaha side with Mr.
Robert F. Gilder & Linn Burt.

Took picture again of
Lovelace & Coon at
outlet of river.



Plots 9 & 10 -

" 5 & 6 (found later out)

The last pit (the S. end of
Carney pit) less than $\frac{1}{2}$
a mile S. of county line
shows several feet (nearly)
of typical dark pebbly
Nebraskan (points finely)
of on it & just below

95
gravel is a gray, lumpy
un-stained weathered stuff.
This layer is 6 to 10 inches

deep & grades into Nebraskan
see samples of Nebraskan,
transition, & weathered parts
marked S. end of Carney pit.
This transition material is exactly
like lowest layer in Granite
pit, etc.

The highest point on ridge W. of
bluffs in S. Omaha is 215
ft. above the track of the RR
at the base.

At the great bend below the
men putting in concrete wall
next to river have reached
dark Nebraskan, shading up
into weathered alluvial stuff
with a few shell fragments.
This upper part is brown.
The Nebraskan is here about
5-6 ft. above the river at
very low stage.

This is at Child's Point.
At Coffin Spring, which is
just below first wagon-road
that crosses RR. ($\frac{1}{2}$ m. or so
below Child's Pt.) there
are beds of limestone, rising
3-4 ft. above RR.

On the limestone rest about
3-4 ft. of hard heavy
whitish silty stuff - probably
afluvial.

On this are 2-6 ft. of
sand, pebbly above, &
strongly oxidized in places.
Above this is loess, - but
Lovelock-like below. The
probability is this is
Lumpus stuff.

A little farther down the
bluff the sand rises &
forms a thick bed.

At the next spring, 200 ft
below Coffin Spring,

the ledge of rock is only a
little higher than RR. ⁹⁷

Then 20 ft. up. there is a
bed 1-3 ft deep of white
volcanic ash (see sample)

The man says that there is
sand below again.

The sand rises above & seems
to be at least 30 ft. thick.

This volcanic ash is evidently
a part of a silty layer, & is
not unlike the gray silt on
rock at Coffin Spring.

At the latter the
material is all low at
end of ridge. Rises higher
elsewhere.

This road is near S. line of
sec. 24. - $1\frac{1}{4}$ mi. above
Baldwin.

This is at Parker's place, just
below the Child's place.

The hill with cache-house in
170 ft. above RR.

We visited one of Mr. Gilder's "earth-lodges" with caches on top of this hill.

There is a circular excavation 60 ft. in diameter (some of the others are 80) and 5 or 6 ft deep. No earth seems to have been thrown out, but it is mysteriously removed according to Mr. Gilder.

There is an entrance on the S. side, - a depressed parox way.

These lodges were evidently occupied by several families, and each seems to have had a cache, - N., W., S., & S., & perhaps others. These caches were sunk below the floor of the lodge, sometimes several feet, and were covered with layers of stone, - slabs of local limestone, & boulders.

99
Fires were always built over them, perhaps to conceal them. The material in the caches is always soft and dry, like fine dry loam, - and in this cache there were layers and streaks of volcanic ashes. Under the stones were bones of birds, fish, etc. also potatoes, etc. clams, etc. These were not burial places. Mr. Gilder's materials were obtained chiefly from these caches. He thinks they were Mandan.

He says the Archaean (a branch of Pawnee) follow the Mandan and live in their earth lodges.

No grooved axes are found in the caches, though not uncommon on the surface.

Mr. Gilder suggests that four types of houses appear,

evidently representing
different tribes.
The ways methods of burial
on E. & W. sides of river
were very different, - those
on W. side burning bodies
(more or less?).

Every house site has
fine soil material evidently
washed in & below it
is a layer (a foot or so?)
which was evidently the
earth layer on the roofs -
now fallen. Then comes
floor of house.

Collected bones (mammalian,
bird & fish), shells, flint chips,
etc.

also collected a lot of
lead shells (modern) on
top of this hill at edge

of house cavity. Cat 101
least 15 sp. - all known from
Loos, were found, - here
170 ft above bottom.
This was timbered & is still
so nearly.

This tract (the Chiles
tract of 1200 runners)
is very rough and heavily
timbered.

These house-sites are
common. We saw several
and Mr. Gilder says he has
seen at least 200.

We also saw what appeared
to be two burial mounds, but
Gilder says they are scarce
on this side. He thinks
the Mandan buried their
dead low down along bluff.
At the Coffee Spring in
excavating a road recently
they cut through a mound.

almost at level of RR.
✓ found 18 skeletons.

Oct. 8 - 1910. (Saturday) 103

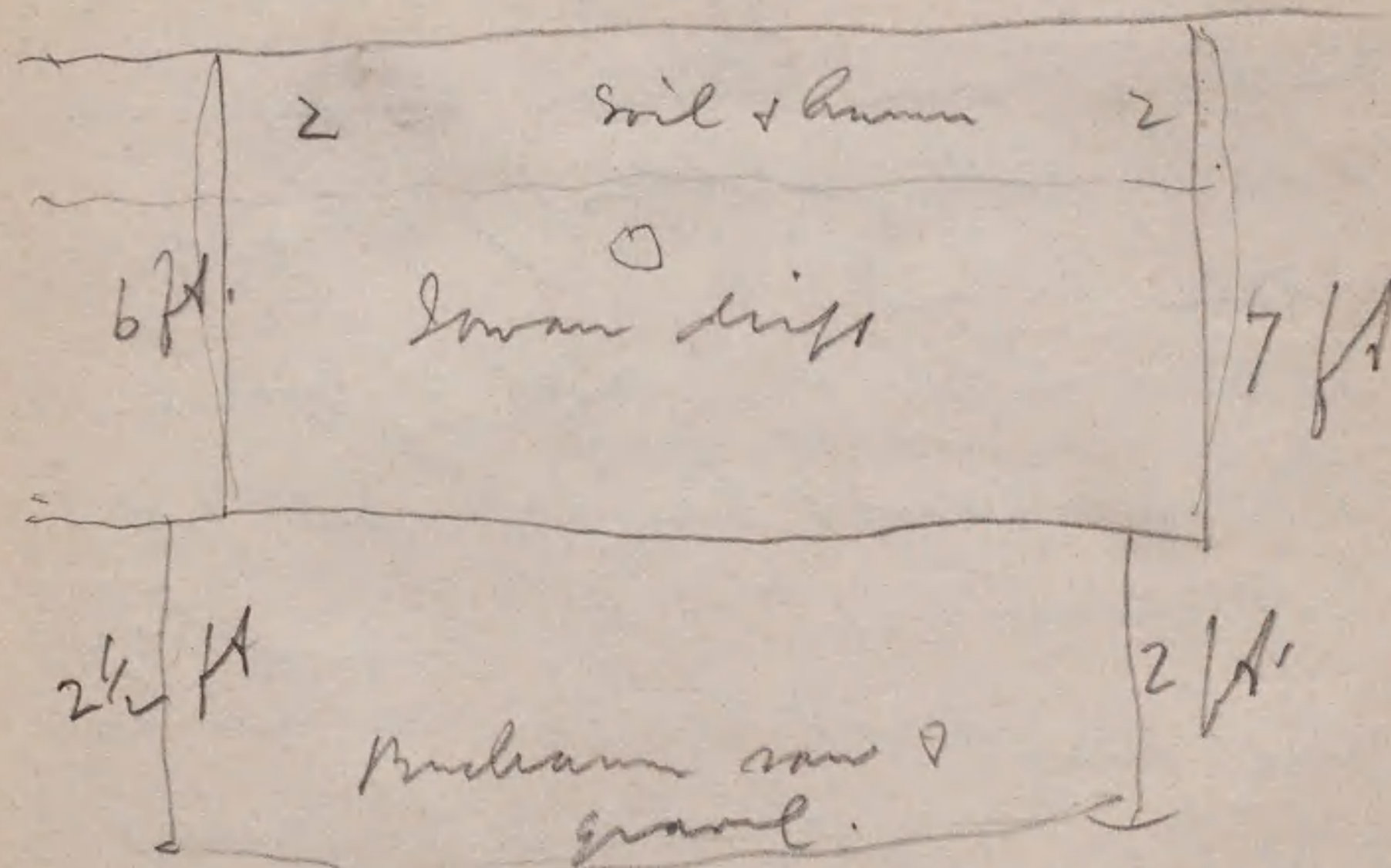
Went to Independence with
Prof. Calvin. Left at 5 am
& worked Independence at 9⁵⁰

Drove to Doris -

An all. Cent. gravel pit is on
N. side of RR.

They here went down to Kansan
dip. On it is a thick
layer of Buchanan.

Clear section as follows:



Clear cut is 2 ft. long.

Took 8 photos.

The brown is yellow, porous,
coarse, standing up into soil.
A few boulders appear in it
some pebbles & occasional little
bits (pockets) of sand.

The line between drift &
Brushman is very sharp.

The Brushman is here much
like very rubber weathered
aftonian, ^{rather} fairly stratified,
with a few rotten boulders, some
small boulders, & pebbles & sand.
There are iron hollow concretions
(looking like pebbles), also a
little lime.

Took sample of drift & gravel.

There must be 15-20 ft
of gravel.

The drift at bottom is typical
Kansan, with large boulders.
(Says Prof. Calvin).

Some of the big boulders dropped
down from Kansan.

Unfortunately in fact the
brown things out & only the
loamy part appears.
But a few big boulders appear
above here.

Nov. 11

RR. to Iowa City	.50
RR. to Sioux Falls	6.25
Breakfast (Orleans) Estlinville	.50
Dinner & Supper, Docketville	
Sioux Falls	1.00
Living, Fortune #4361	2.50
RR. to Canton	.62
Nov. 12 Teams, 2 trips, Mendon #4362	4.00
RR. Fairview to Westfield	.84
Brushwood Hotel, " "	.50
Team to Ridgeland #4363	1.00
RR. to Hawarden -	37?
Hotel (depot) Hawarden (room)	1.00
Nov. 13 RR. to Sioux City .84 +	
to Osawa .76, =	1.60
Breakfast, Arcade cafe -	.25
Team (Hicks) to Grain	1.50
RR. to Mt. Valley	.77
Lunch - same lunch room	.20
Team (Cox's)	1.50
Supper - Miller Hotel	.50
Dray - barrel -	.25
RR. to Cedar Rapids	4.90
C.R. to Iowa City	.50

31.05

Nov. 11 Friday, 1911¹⁸⁷

Left Cedar Rapids at 1:00 am.

at Spirit Lake a man & woman came aboard. The woman had yellow hair (looked like red hair bleached), she was topped out in style & aristocratic in bearing. Her face was old & wrinkled, but she put on airs.

She had a dog which was given a seat beside her in the chair car & the husband had to flock by himself.

Big cement plant & large shallow sand pit just E. of Sibley - N. side RR. W. of CRD & P. & N. of

Shindler. The prairie is flat, to the east the "moraine" runs down northward, & is continued

Reached Fox Falls at
noon. Took dinner at
Dacotah Hotel & drove
east.

From road going E. we can
see that the big Sioux valley
has been gouged out of
a great plain (Kansan)
nodules less in road
along, 1/2 mile E. of the
town to north.

Took sample of nodules
along road, middle of
N. line of sec. 18 - E. of
Fox Falls.

On N. line of sec. 17 there
are two cuts in road across
ridges. The W. shows
about 8 ft. of yellow loam
nodules above 2 ft. & with

189
iron clonings / scattered nodules
below.

(see sample & nodules
about 6 ft. deep)

The E. cut is similar, but
unfossiliferous (only 6 ft. deep)
as are other cuts eastward.
The country eastward drops
down to river by a series
of ridges, & everywhere
this is typical rolling
Kansan.

Took levels westward.
Station at 1000 ft.
at top of 2nd cut (east)

(These two cuts are on the
N. side of the NE 1/4 NE 1/4 of
sec. 17 - 101-48.)

a series of low ridges for
a short distance.

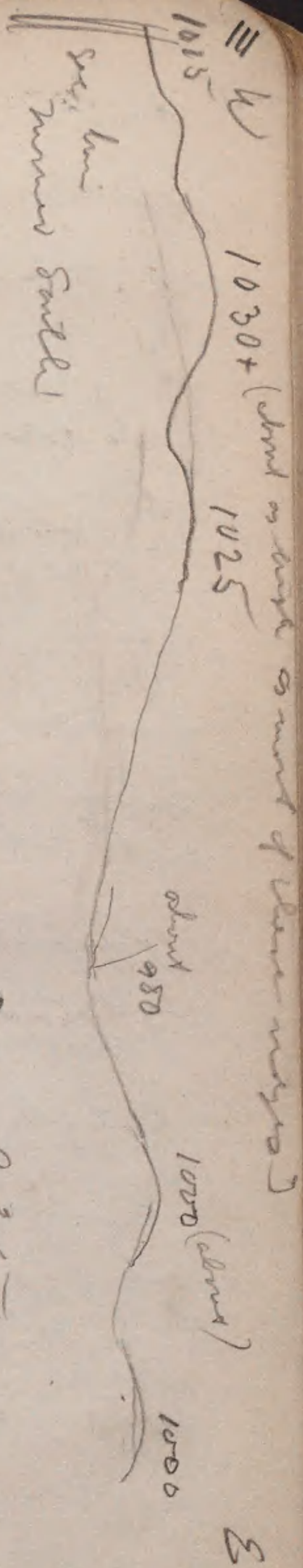
As we approach Sioux
Falls the country, still
showing drift at surface,
becomes much more
rolling.

In places red boulders
cover slopes.

This rough area
seems to begin just
about at county line,

(This should go
back - skip two
pages)

At Cent at corner S = 935 ft
(near middle of line on 19-20-48)
A cut just N. of RR, a little lower, shows
3 or 4 ft of loess on top of layer
underneath. There is some loess, all along,
cut right at RR also shows some loess
a thin sandy stuff at top of formation!
Living



little 1st (west) quarry
at E. of Falls. Kaum
rest on rock.

E. of turn to E. of Falls on
E. of (SW. cor. sec. 20-101-48)
lower part of slope (Kaum
is exposed (see sample)
there are pebbles

Boulders, granite, etc. etc.
above the loess - calcareous
at top

About 3/4 mi. ^N E. of same
(near SW. cor. sec. 20-101-48)
cross-roads at least 7 ft

of loess shown in road cut
(high point - 1025)

Below this, part way down
slope to W. is a distinct
slope to W. is a distinct
layer (about 1-2 ft) of
blue loess with large
iron tubules.

Below this is drift, strongly
oxidized above.

This is a clear case.

See sample of blue loess.

The highest point in
this part is just west

(a few rods E. of 1st
mile corner going W. for
cross-roads) - ≈ 1030 .

(3/4 mile W. was just about
right.)

Highest pt (1095) is just

W. of 2nd mile corner
(SW. corner of sec. 24-101-49)

Road at top of hill,

2nd cut E. of Ill. Cent

(near Collins) = 1015

upper end of 1st cut E

of Ill. Cent = 985

Ill. Cent RR (near
Collins) = 990

RR tracks in town (on E. side river)
= 945 ft

The barometer was very steady today.

I called on Mr. A. Collins & borrowed the horse-tooth which was found in his pit, ^{the location of} and which is described in my notes of last summer.

Going S. from Swiftdale
on Clifton P.

at Swiftdale	925
then	905
then	980
then	930
at Harrisburg	910
then	870
"	855
"	830
"	785
Canton	705

Reached Canton at 8 PM
& met Brox.

Nov. 12 - Saturday ¹¹⁵

~~Drove~~ Drove N.E. to upper bridge & N. on E. side to slide.

I found the readings as follows:

Top of slide	865
Top of Aftonian	850
Top of Nebraska	845

Section

1. Kansan joint clay $1\frac{1}{2}$ -2 ft
2. very heavy calcareous silt 1-2 ft
3. cross-bedded sand 7 ft
4. calcareous plate 2-4 in.
5. Nebraska

No. 1 - Kansan.

Only about 2 ft exposed -
It is a blue jointed clay with
calcareous nodules. Above
on the slope there are Kansan
boulders.

Lies on very top.

No. 2 The silt layer is
whitish, very calcareous &
contains aquatic shells.
It is $1\frac{1}{2}$ - 2 ft. thick &
shades down into sand.

No. 3 - The upper part of
the aptain sand has
numerous calcareous plates
(up) alternating with sand.
Some of the shells are
in lower part of silt where
it is sandy.

The sand is beautifully
cross-bedded, with a few lines
of pebbles, & ferruginous
streaks, especially below.

No. 4 is a series of calcareous
plates at base of aptain.
It is a sand plate, cemented.
(see sample)
3-6 in thick.

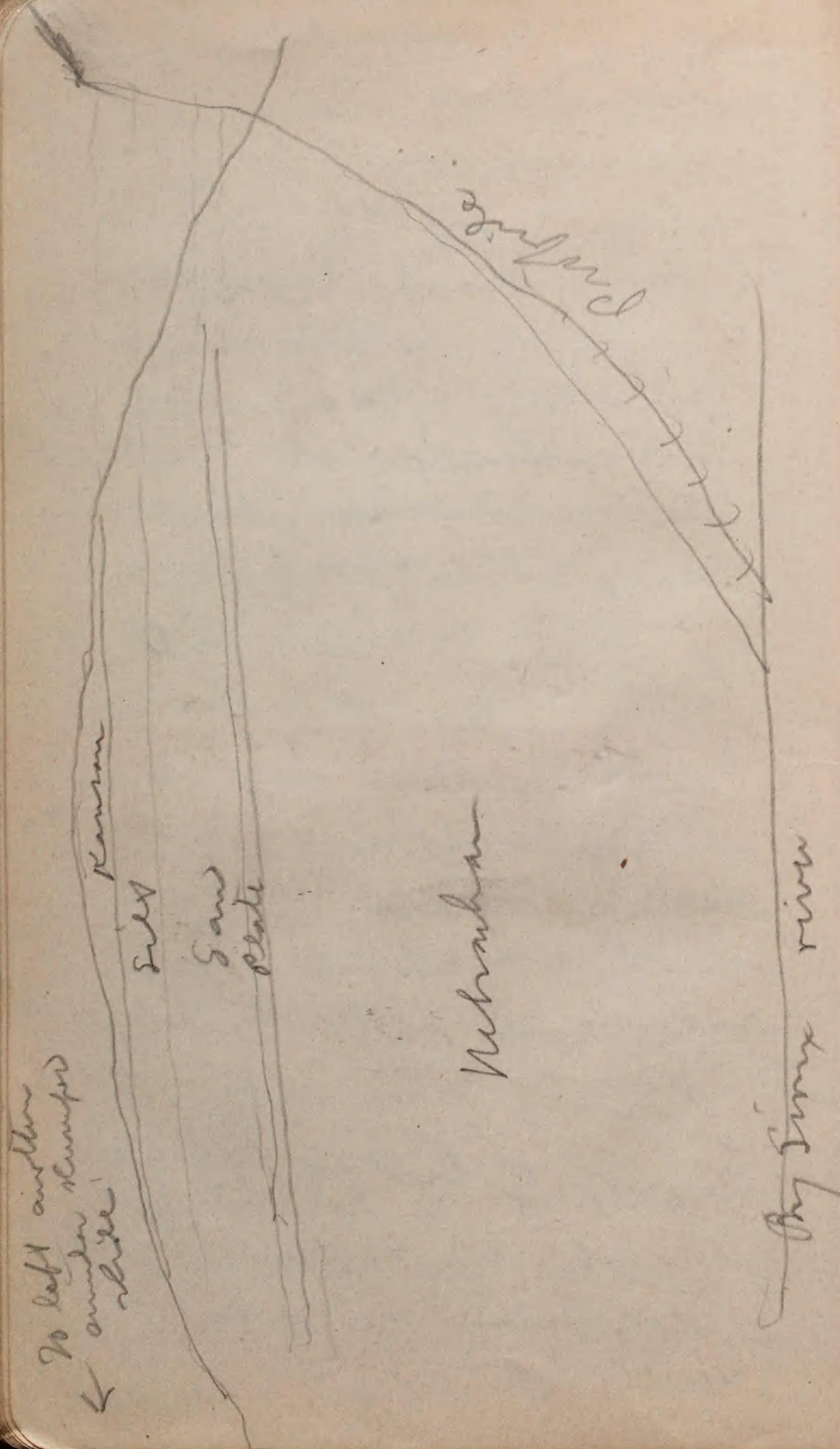
No. 5 is dark heavy joint
clay with pebbles & a few
boulders. It is evidently
Nebraskan.

There is a little silt between
No. 4 & 5 - about 3 in.

No. 5 runs down 60 ft.
to low water.

This runs down into the
water. It is a clean
case. This stuff does
not slump, & it is
exposed all the way
down.

To top of bluff = 170 ft
& farther north the bluff
is probably 15 ft higher.



The smaller slide S is similar, but does not show as well.

Springs come out between the two slides in a ravine, evidently at height of sand.

Going up the left (K.) part I took sample of Nebraskan at 770. It is typical crumbly loam.

The Nebraskan in place contains large & small boulders of granite, gneiss, etc. It is quite pebbly in places. The first exposure of Nebraskan I know

Top of Nebraska is
at 785

Top of Aftonian is
795

Top of Kansan is 810
The Kansan in this
part is typical joint
bluish clay, with small
boulders & pebbles,
Bottom is 725

Henne

Nebraska = 60

Aftonian = 10

Kansan = 15

85

170

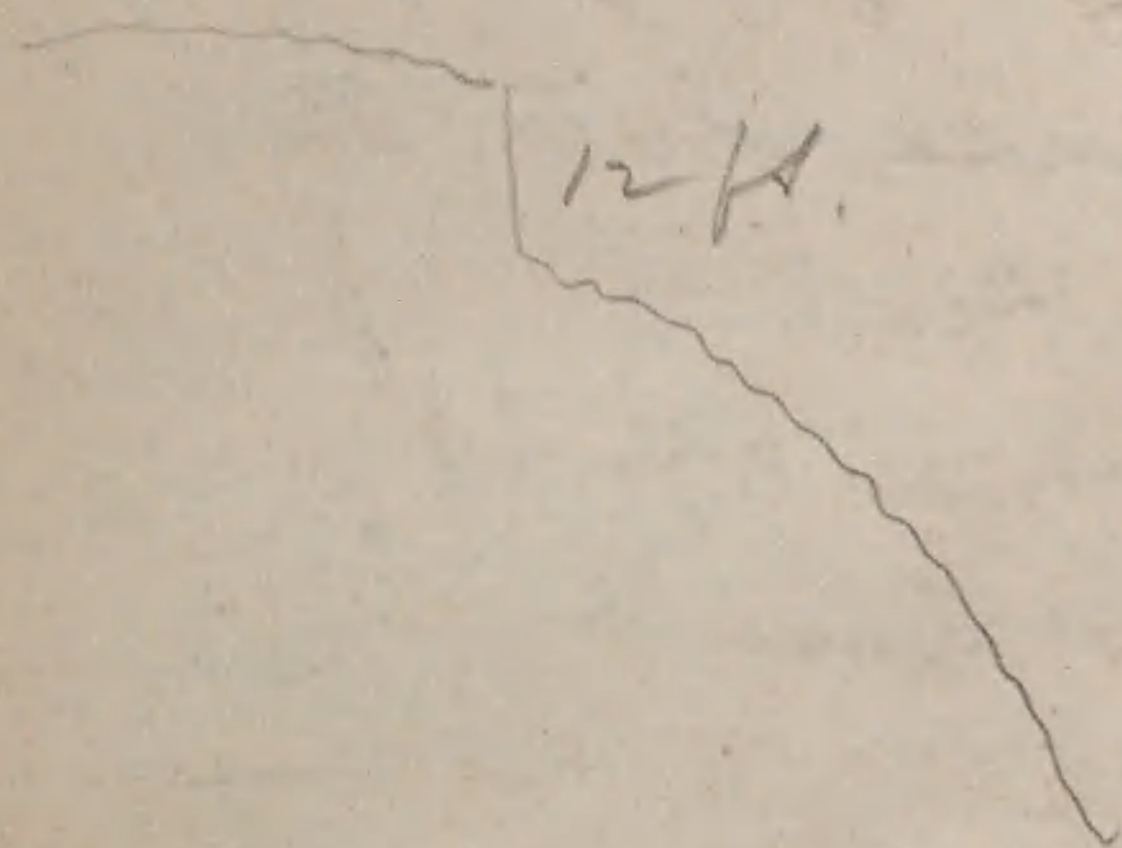
121
Started S. at 10:30
The rough bench S. is Kansan
its top 865. This is
on sec. 14 of sec 1-97-49,
The road cut on the
oblique part of the road
exposes a mass of true
Kansan, with boulders, etc.
The bottom S. E., at
foot of hill - on road,
read 770 - hence
Kansan bench is 95 ft. high.

Bottom at foot of landslide
hill opposite rapids = 760
W of slide hill = 890
Just S. rises to 910

" S " " 935

This is Kansan close to top,
but the ridges W, S & S.E.
rise considerably higher.

The slide hill shows a
great mass of drift -
slipped at least 12 ft



on the north side.
The drift comes to
top & is quite yellow
(no varnish).
But I think it Kansan
This is in N.E. $\frac{1}{4}$ sec 12
97-49

The slide indicates
Aftonian below,

Foot of hill to S. = 780 123

On S. ridge (just S. of creek)
there is a bed of sand, its
base at 895.
It is fine, beautifully
horizontally bedded, & a
big hole is worked out
a great granite boulder
(3+ ft.) placed on one
face - dropped from

Kansan above,
about a foot of calcareous
Kansan shows above sand
in cut, & above on
slope are boulders &
pebbles.

Could not make out
lowest member.

The top of Aftonian is
905 & the line is very sharp,

& more or less calcareous.
above is back of main
group, the typical bluish
calcareous Kansan is
exposed - clearly on Aftonian
& rises to top of knob.
Portions of this Kansan are
yellow & weathered & are
just like material from
slide.

Knob reads 955 - top.
It is Kansan clear to
top.

Further south on same ridge
(now where ^{cattle way} ~~graded~~ cuts
new road - top of ridge = 930
Top at cattle way = 905

Stripped cattle way first.
Top of Aftonian (here low) = 905
Top of Aftonian ~~red~~ = 895

This 10 ft. of Kansan is 125
typical, bluish, calcareous, &
with pebbles & small
boulders.

The Aftonian silt (see
sample) is quite sharply
separated from Kansan, &
line is more or less oxidized.
The silt is gray, horizontally
laminated, & I could follow
it down to 885 &

it probably goes lower.

This silt is largely really
a very fine sand
found fragments of shells in it.
At 880 there is fine sand
& this can be followed down
to 870 - then all is
slumped.

The big slump N. of
cattle way also shows
gray silt & some sand, but

it is all slumped.
The lowest bottomland here reads 795

all along southern at
about 815 - 820 there
is more or less sand
with great shrap
coming out from under
it.

The springs come out on
what appears to be Nebraska

top of hill where road turns
west is 1005 ft. The top
here has massive yellow loess, -
probably not more than 3-5
ft.

Loess all along road, but
Karnian shows on lower slopes,
loess probably rather 700 ft
in place.

At SE cor. of sec 13
there are two loess -
the blue loess appears
about whole height - only

127
a foot or two of nodular loess
low.

Lower loess with lower
iron (luteous) & some nodules

The first cut east shows Karnian

2nd cut Karnian below - 1-4 ft

blue loess - iron & calc. -
& on this 1-3 ft. yellow loess.

The 3rd cut - just at end
of first 40 a. shows
all three members.

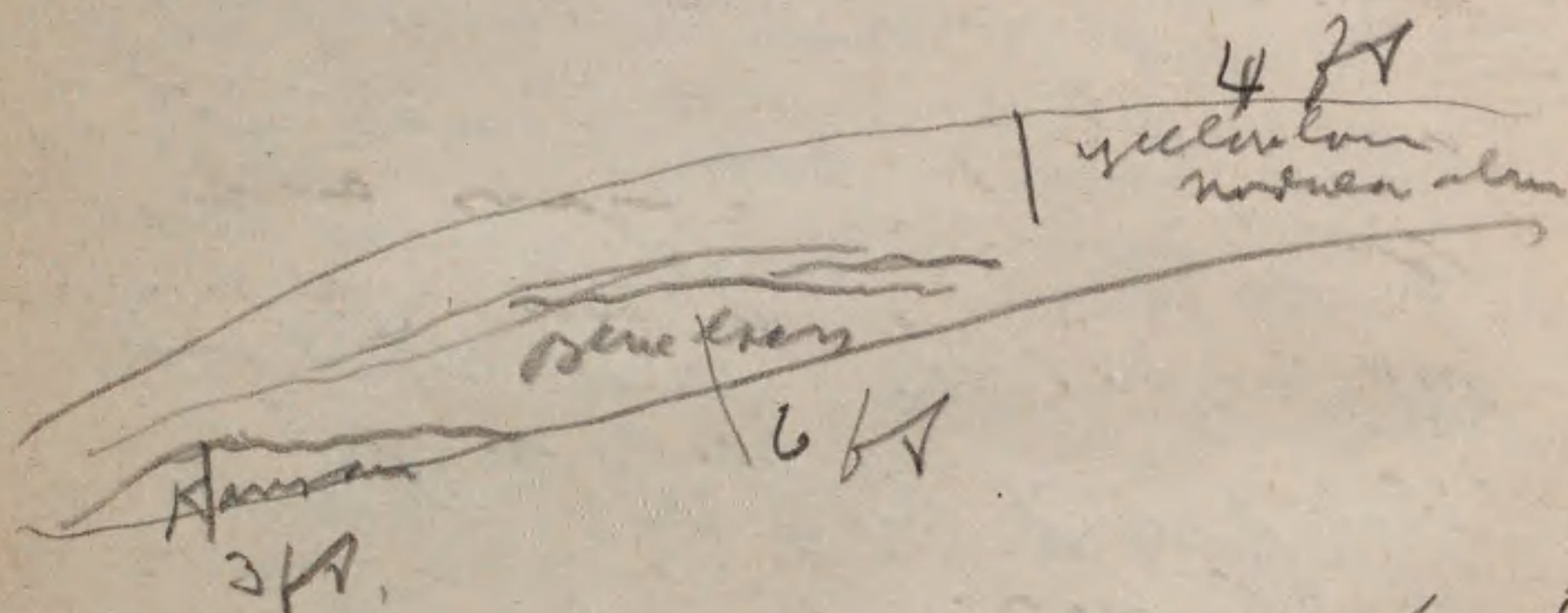
Two more cuts in next 40
show same

Next 1/4 mile shows 2 cuts,
the same.

In next 1/4 mile only cut is within
a few rods of E. end of mile &
here Karnian & 2 loess show.
all along loess shows in
road (yellow loess)

The highest pt. in the next
mile (highest on plateau) is
1060

In sec. 22 - a long cut shows



The two loess are separated
by oxidized band.
The loess & Kansan
sharply separated

840 is top of Fairview
bench.

820 RR. depot,

129
The plateau which we
crossed along road S. of river
to Fairview is rolling, high,
or level with Iowa plateau,
& the heavy timber on slopes
along river doesn't show
at all - all out of sight.
Yellow loess covers all, the
upper part very finely nodular.
There is much blue loess
& Kansan shows at several
points on lower slopes.
At turn of road before
(or just at) going N. to
Fairview there is a good
exposure of fine Kansan.
Left Fairview at 2¹⁸
for Westfield.
Mr. Root took team
back to Canton.

Reached Westfield at 3.42
and at once took team &
drove to Richland, So. D.
At the point of ridge I
found Cretaceous (a well
limestone?) rising about
20 ft. above road, on the
E. & S.W. sides of the point.

Drove N. along road over
the ridge, and found yellow
nodular loess in road cuts
as I ascended. I could see
no drift.

Returned to Westfield, took
messenger, and left at 6.40 PM.
for Hawarden.

Put up at depot (C. & M.W.)
hotel, called on Stone's.

Nov. 13 - Sunday¹³¹

Left Hawarden at 3.30 AM.
via the new C. & M.W. cut-off.
Reached Onawa at 7—

Drove to Farm. Visited
Bulwer's & Mather's
But lot of loess & tuff
Took photos of loess with
one column.

Visited pits —

There were shown about:

Loess — 4-6 ft.

Kanran. 1-5 ft.

Gravelous 2-4 ft.

Cross-bedded yellow loess —

about 10-12 ft.?

Then white loess 4-6 ft.

Lower of silt & below it mostly
sand & gravel — total 4-10
in. (silt about 1 in.)

Below that white loess.
3 ft.

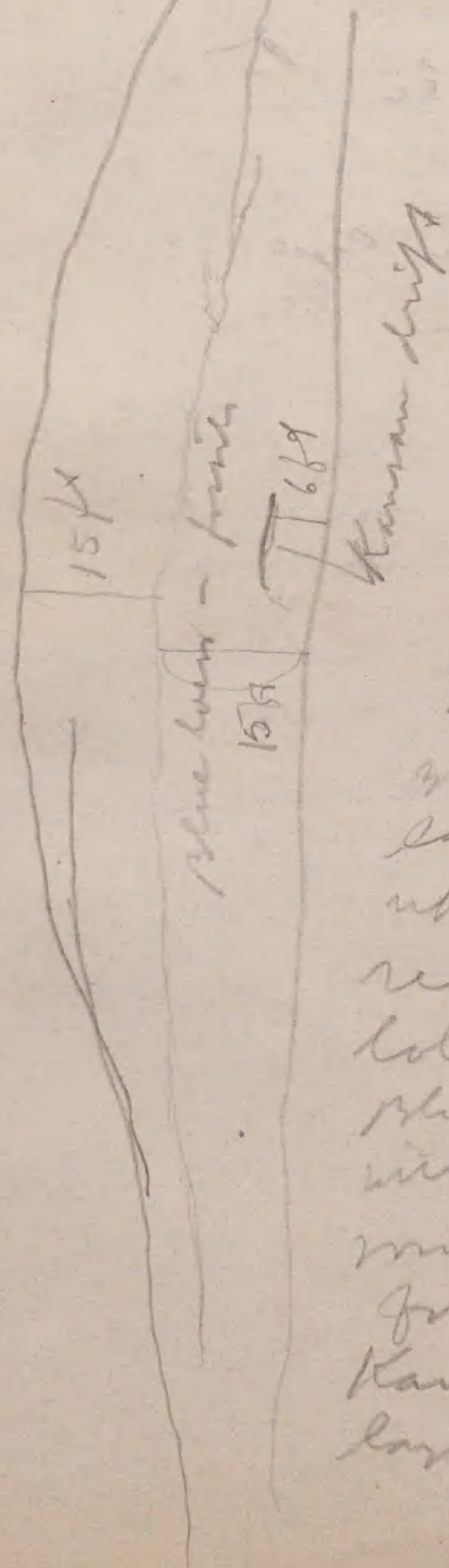
But at S. end ground at
base — from this ground
come bones.

White sand has clay nodules
& many fragments of
shells.

Return to Onawa, at 1 pm
& just make train.
Some old delay by same
old grumpy agent.
Complained that I was late,
& I had been standing at
the window for some time
waiting for him.

Nov. 20, 1910 Monday ¹³³

Visited the B&O cut
N. of Cedar Rapids.



The upper loam is
yellow, heavy,
laminated below
uppermost 4-5 ft
redder & coarsely
lobular.
Blue loam typical
with iron tubes, few
small nodules &
fossils.
Kansan with dark
layer above.

Account

Nov 24 - RR to CR.	.50
" 25 - RR CR to Denim	4.02
Basket for bones	.35
" 26 - Hotel Denim	2.00
Bus	.25
RR to Co. Bluffs	1.30
Supper at Royal Cafe	.25
car fare to hotel	.10
" 27 - RR Co. Bluffs to Ia City	5.24
Supper en route	.50
Bus Iowa City	.25
	<u>14.76</u>

Nov. 24th - 1910 (Thursday) ¹³⁵

Left Iowa City at 9:30 pm

Nov. 25th 1910 Friday

Left Cedar Rapids at 12:05 am

Reached Denim at 5:30 am.

Went to Denim Hotel.

Night clerk says Mills has a pit a mile below town, also

works one along creek just

west of depot (my old pit).

Also says there is a pit near

Ill. Cent. depot right in town.

Also a great pit at

Deloit - 9 mi. north.

Went out on Court str. Just

W. of Pleasant str., on N.

side of Court, near Ill.

Cent. RR depot (2 or 3 blocks

from it) is a good sized

sand pit,

the sand is rather fine,

stratified ^{yellow} & somewhat cross-bedded
about 10-12 ft. exposed.
there are silty bands in it.
(narrow)

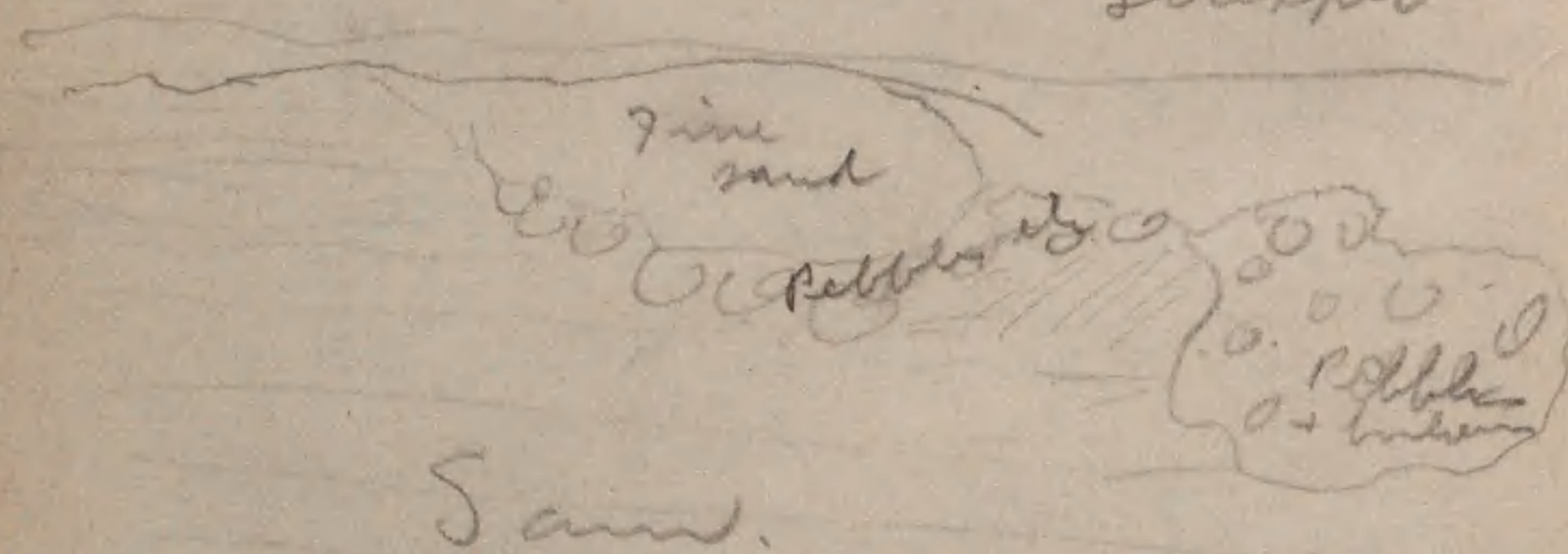
(narrow)
There are white lime nodules
in it - sub. -

Also fragments of shells,
alternating coarse lines of sand.

above the sand is a layer
of coarse gravel & small
boulders - more or less cemented,
& uncompressible.

one part =

Stricker

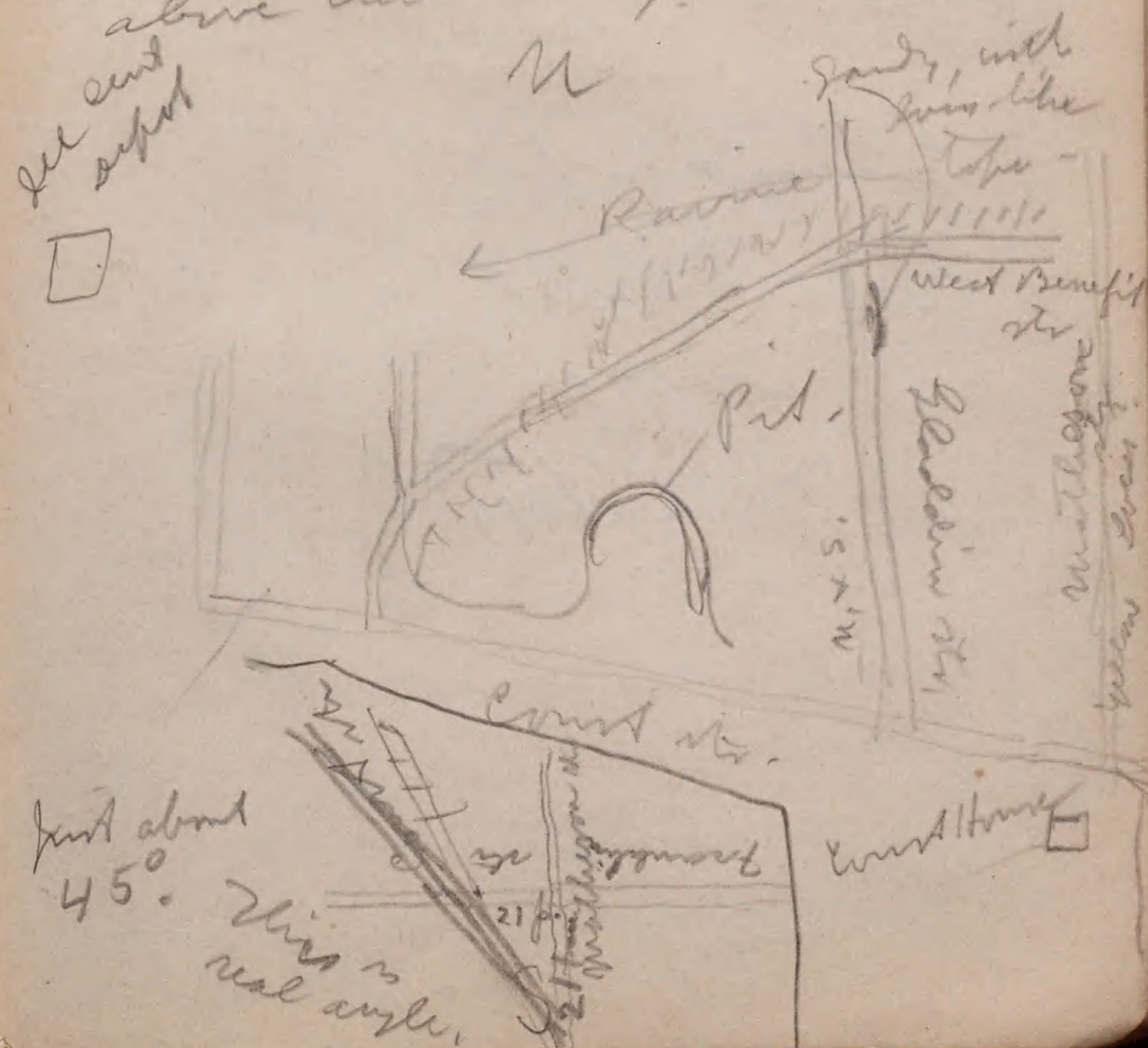


There are small bombons
with the pellets,

Occasionally pebbles appear
in sandy part throughout
the upper gravelly belt -
irregular, but run about
2-3 ft.

above it is a sandy brown
(* at top black) loam,
about 2-3 ft

This pit is far way up the slope, & probably 40-50 ft. above the valley.



Along gladden str, the hill
is considerably higher - 75 or
more feet, but sand comes near
to top.

This is a long low ridge,
lower than hills N & E

It is covered with what
seems to be clearly yellow
loess,

Met Elmer Mills
Devision

Father own pit. Ia.

James Mills
Devision

Iowa.
will accept 10/0

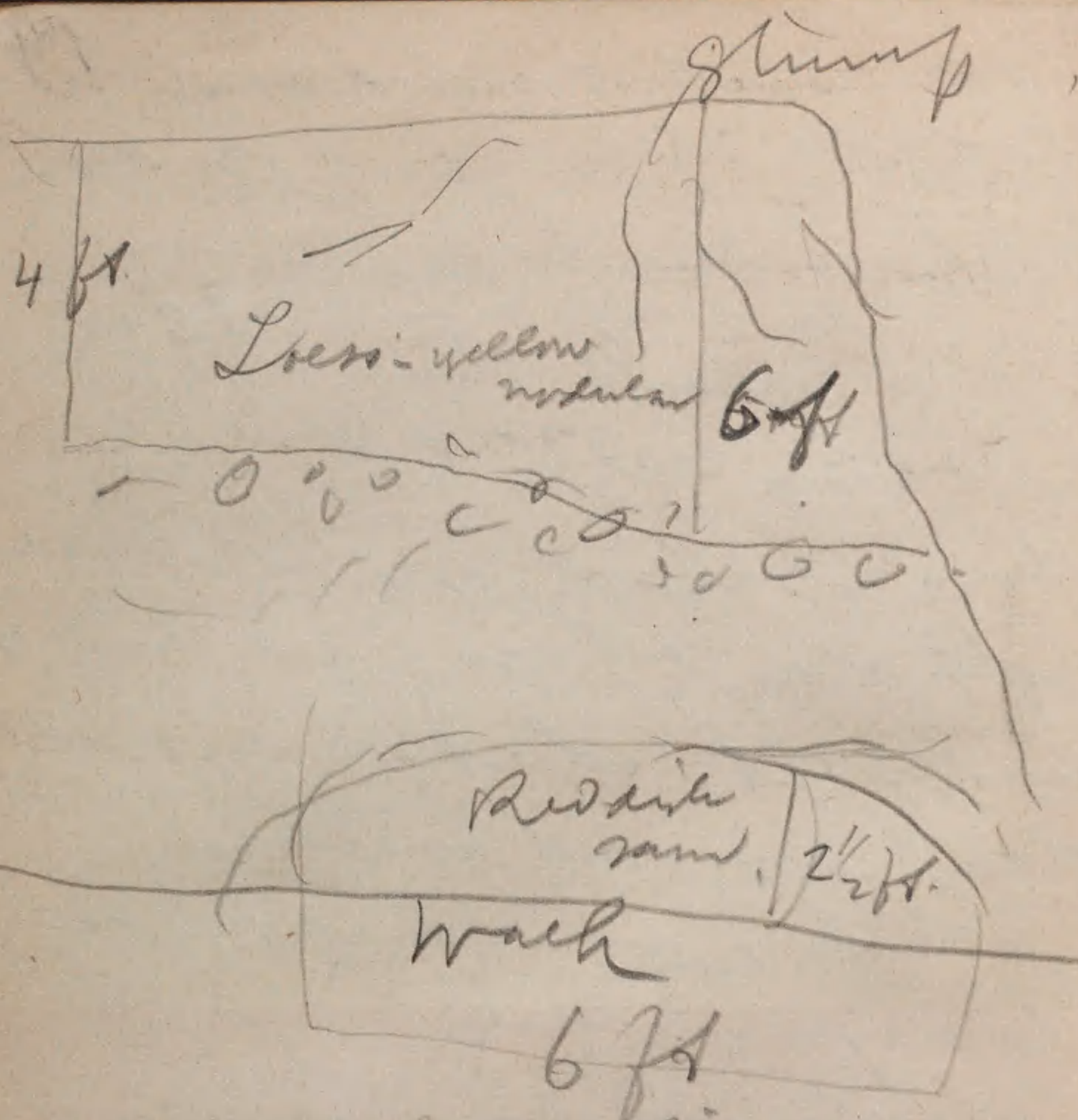
139
Pm. went west along
C & NW with Jm. V. Barber

On E side of Main str.
alt. of wall N. end = 950 ft
S of W Walnut there is a
cut along wall 6-7 ft. This
shows a band of gravel & boulders
with clay not over a foot thick
under it what is evidently
clear (somewhat weathered)
yellowish Kansan drift, - very
lumpy in places.

Above gravelly there is
about 2 or 3 ft of dark loamy
stuff.

A little farther down hill
the band of gravel is
less distinct & even disappears &
sand boulders are numerous.

At lower end of this block
(alt. 945) there is a big
boulder of red dirt sand
(see other side.)



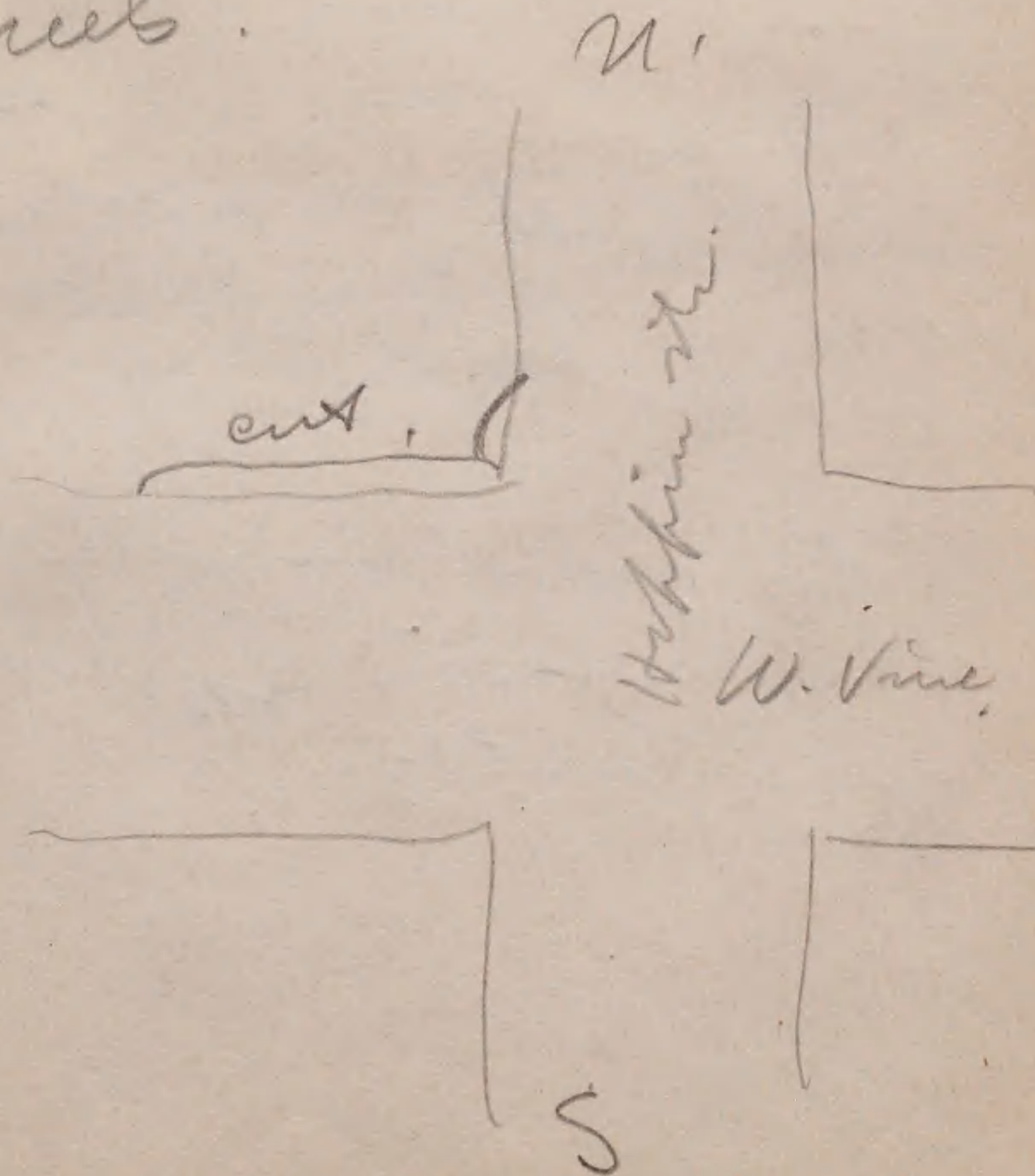
RR. at foot of hill = 910
 Bottom of pit at S. end = 900.

Went to Mills gravel pit between RR's. & me on S. side C.M.W.
 Found this terrace gravel & sand. Does not show in bluffs.

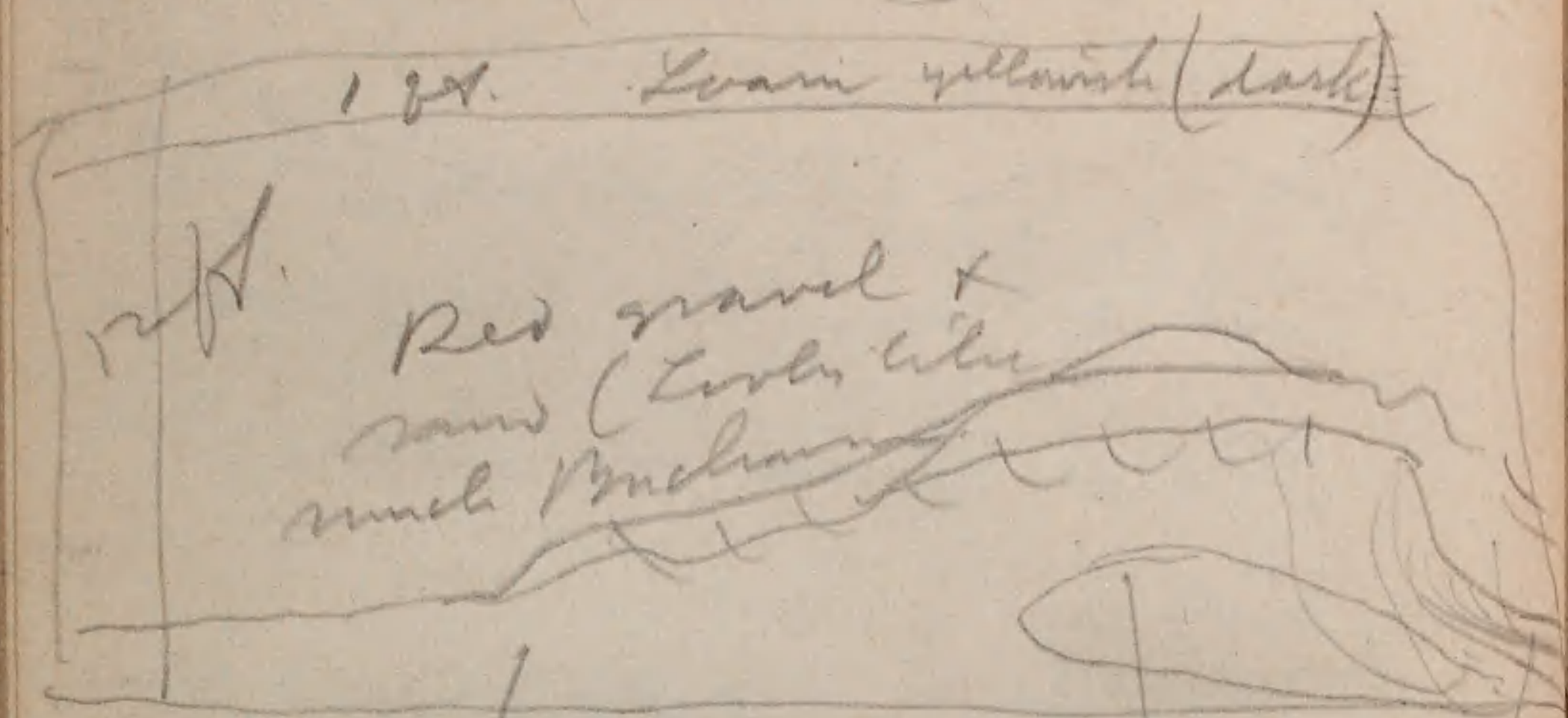
Returned to my old C.M.W.
 RR pit & found several shells in sand.

It is in this part that tusks & antlers were found.
 Other bones in pit between RR's.

Went to cor. Hopkins & W. Vine streets.



This cut shows as follows:
(S side)

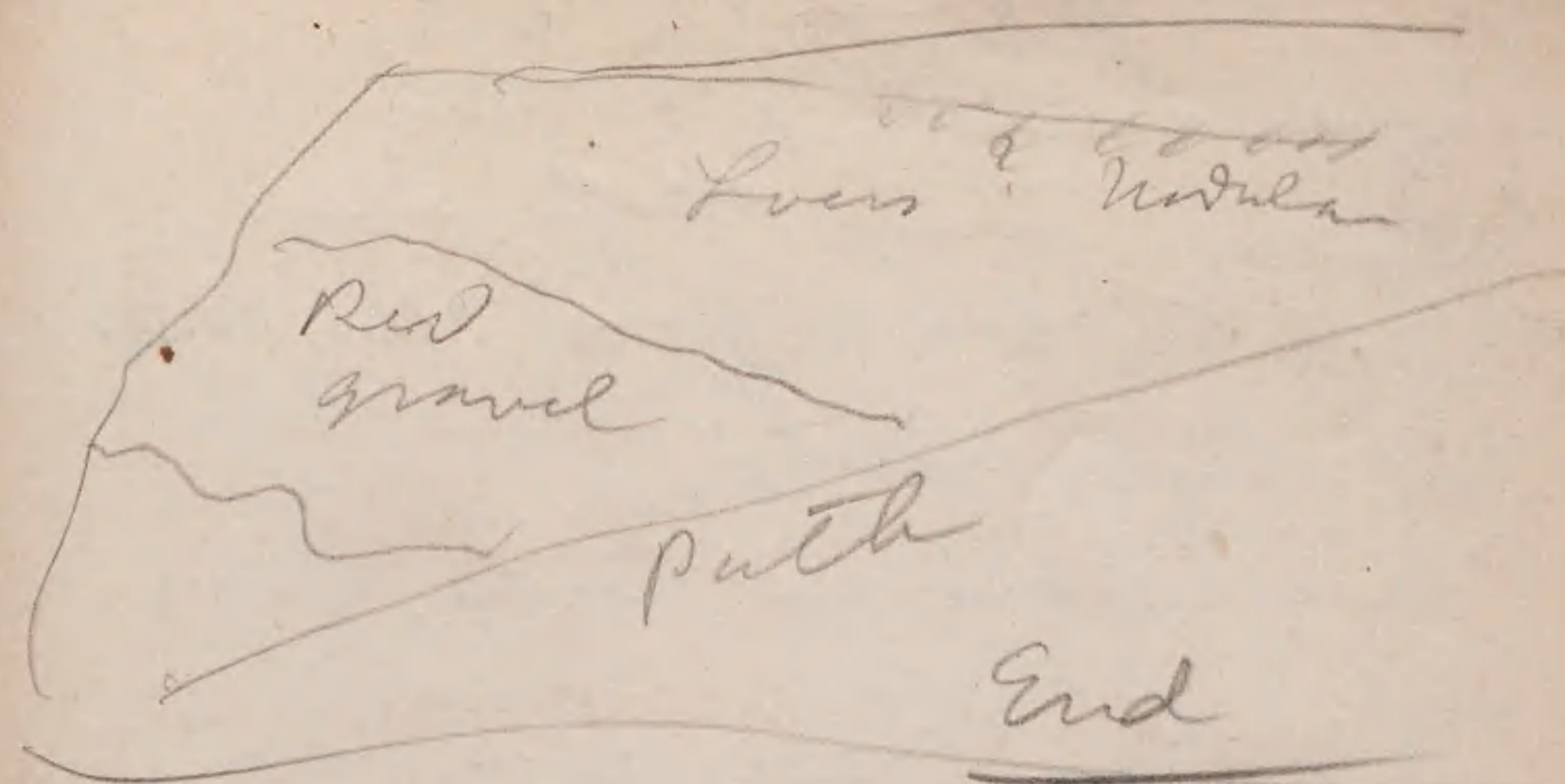


Looks more like old.

Looks very like Kansas (a lump)

Gold.

The gravel has rather boulders in it. Also iron boulders.



There is a great slide along S. side of river S. of Devision. This needs attention. The pits at Deloit are evidently along the western branch of the Boyer.

Nov. 26th - 1910

Left Denison at 5:17 am &
reached Council Bluffs about 7:30
Took breakfast & found Mr. Moenig
at High School.

Found bones and teeth, & they
will be packed.

Took lunch with Wilm, then
visited Meyer & the Finklin's &
saw "Hike" (Dr.) Finning. Called
to Miss Rose.

also Mr. Bender who takes
Thomas' place in physics.
Thomas goes to Sheldon.
called on Wickham Bros. They
are working the upper 2 pits
yours to work first one.

Visited Wickham Bros.
E.A. Wickham -

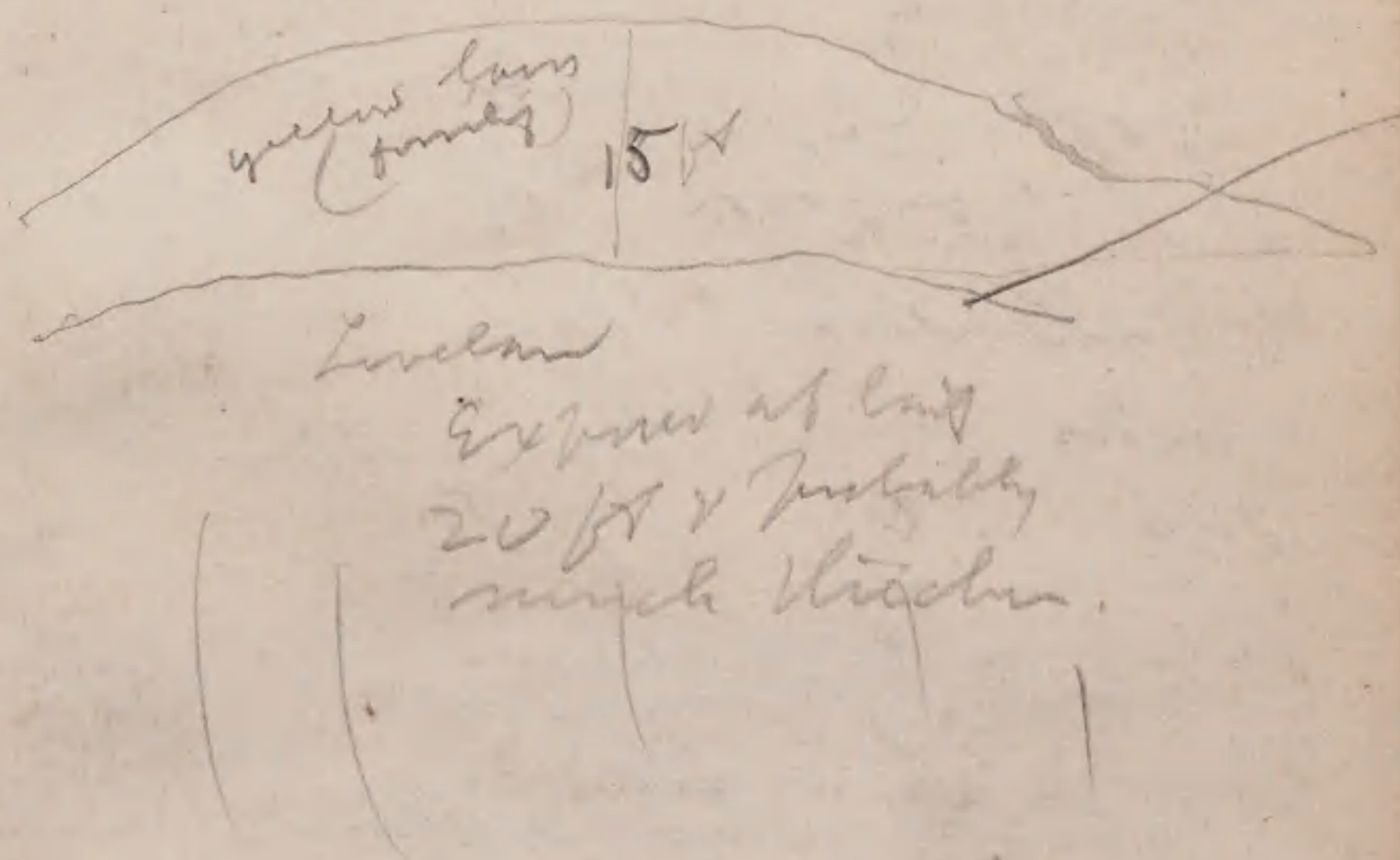
(send paper.)
will have bones
In evening went to Elder's & got
skulls.
Then visited Rev. Broz at Rev.
Vedrick's, with Burns &
Harrish.

Nov. 27, 1910

145

Went S. at 10 am with
Mr. Elder.

Took photos of cut at
sewer mouth in So. Omaha
showing Loveland & bones.



It is 85 ft. from CBVQ
RR. track to top of
Loveland (East 15 ft.
~~exposed~~)
Lands is 15 ft higher &
hill rises at least 35 ft
more.

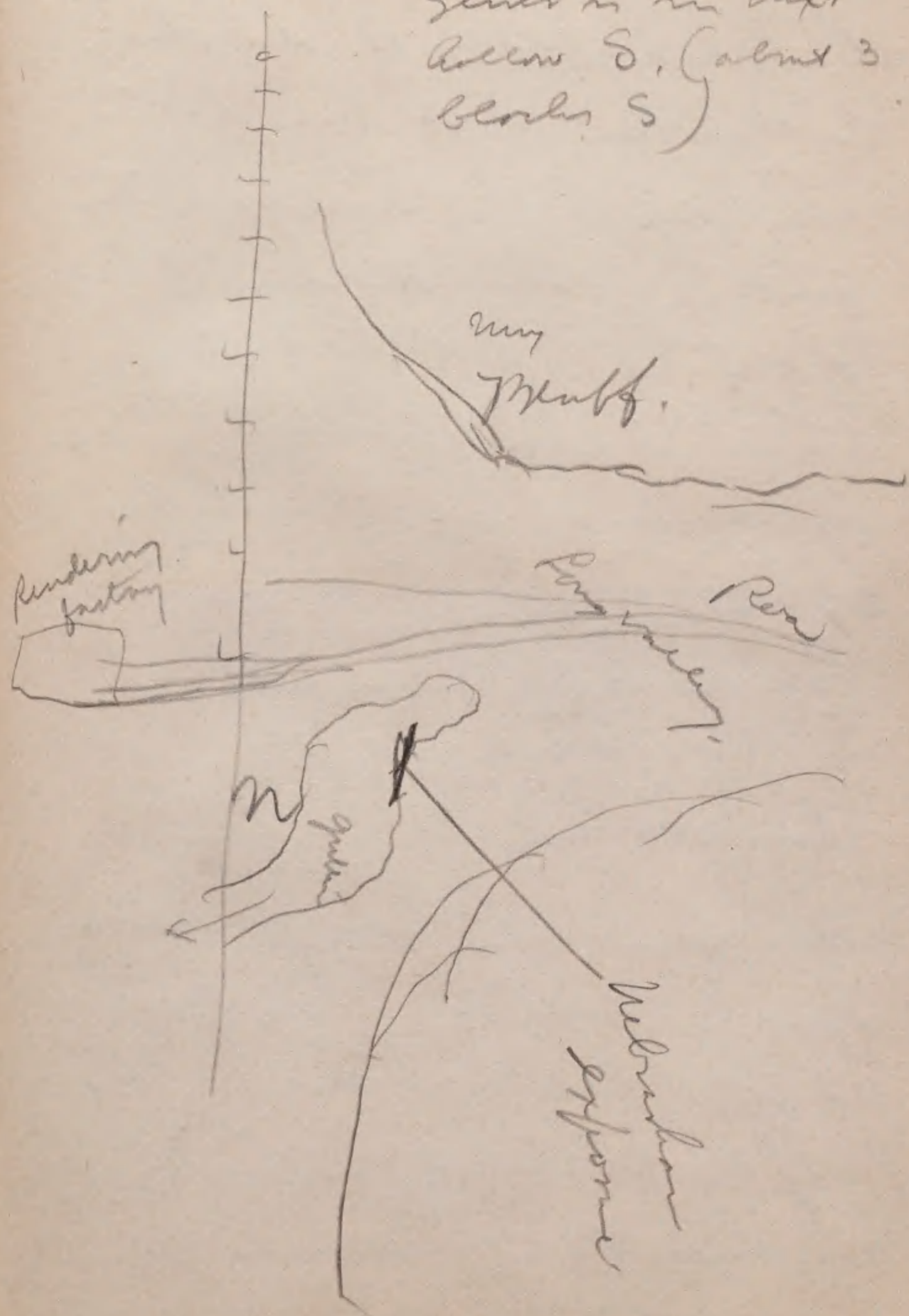
Great clouds of dust appeared
above bar opposite Omaha.
Day is very windy.

At the foot the bluff & north of road, & rising about to level of RR, is a bank of blue-black Nebraska with pebbles, (about 4 ft. exposed) & above it on a foot of gray laminated stuff - some of it weathers Nebraska & some evidently old. In the gutter below there are boulders, mostly dark, coming evidently from either above a Kanran water runs over Nebraska.

147

S.

Genes is in next hollow S. (about 3 blocks S)



The river is in next big
 ravine S. all along this
 up the valley for some distance
 there are heaps of dark
 Melrose which has been
 thrown up when river was
 put in. It contains pebbles
 & small dark boulders.
 There are also patches of sand
 & blocks of conglomerate, evidently
 a fluvial.

Loveland is everywhere
 exposed along the side of
 this ravine.

The river runs along Monroe
 str. - 3 blocks N. of co. line.
 at top of hill on Monroe it was
 149 to bottom of river.
 They struck much sand &
 some gravel - all along
 under hill.

Monroe
 Melrose
 Jefferson - Rocking eddies
 Washington
 2
 4
 etc.

They went into 8-10 of
 Melrose at bottom - near R.
 There was no Kanab, only Loveland
 near top of hill.
 Both Loveland & Kanab show
 near top of hill.



Volcanic ash appears - 3 ft.
deep, appeared down in ravine
(toward RR) This was in
sand, —

The top of the hill in ravine
is 135 ft. above RR.

Went out to Lane and off.
The first cut runs west to
31st Ave (western bridge)

at 32nd is a station - elevation
= 1152 ft

Wabash RR runs N. & S. about
on 32nd Ave.

on return elevation
at 32nd Ave. station
= 1115.

(before turn river 6-8 ft above road.)

Grade 1110

Top of level 1140

Road top of blue layer? = 1155

Top of bank 1175

Highest pt. of hole length
W. of viaduct.

Top = 1180

Road = 1155

(top of blue layer?)

Top of level 1185

(Red bed about 5 ft below
top)

another red bed

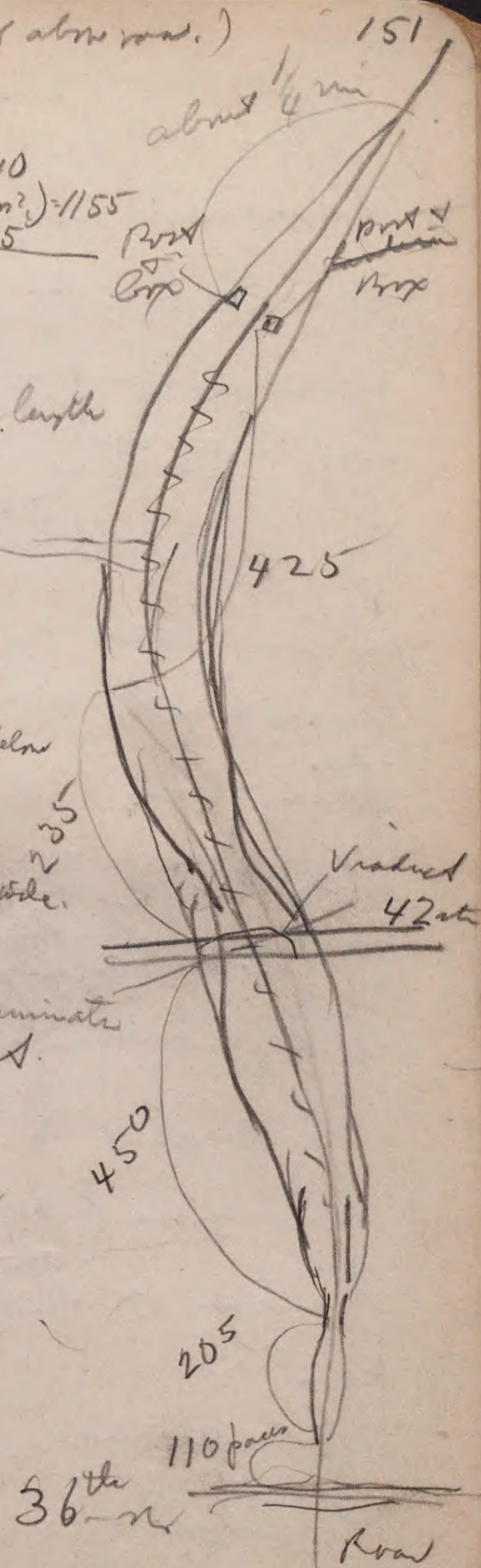
at 1120.

End about 2-3 ft. side.

RR = 1090

at base more laminated
red stuff 1-2 ft.
(all level 1185)

on return 1135



The upper line of the
Loveland uniformly follows
the vertical contours, & the
present surface, while higher,
was determined in its contour
by the old time Loveland.

The loess is here quite
uniformly a series, though the
blue loess varies in thickness.

The strong lamination at base
of cuts suggests that the base
of the Loveland is not far away.

It ought to be easy to
determine (by boring) whether
Kansan or Aftonian is under
it.

These are the finest sections
of Loveland which I have
ever seen. This should have
been called the Omaha!

153
Left Cornudas Bluff at 6²⁵
P.M. for home.

Dec. 21-1910

Left		
Iowa City to Fairfield,	\$ 1.61	
Transfer "	.25	
RR. to Hamburg via Red Oak	4.54	
Breakfast, Evans/home "	.30	
Hamburg - dinner	2.50	
RR. to Langdon (2)	.90	
RR. to Rock Port (2)	.50	
	<hr/> 10.60	
Livery - Rock Port	2.50	
Hotel - Rock Port	.40	
Back to Langdon (2)	1.00	
RR. to Co. Bluff	1.45	
Wells cafe - dinner - Co Bluff	.30	
" " supper - "	.25	
RR. from Co. Bluff to Ia. City	5.24	
	<hr/> \$ 21.34	
	.40	
	<hr/> \$ 22.74	

Dec. 21, 1910 Wednesday

Left Iowa City at 6:18 PM, via Elmore. Reached Fairfield at 11:35 PM. (nearly an hour late).
Left Fairfield at 12:41 am +

Dec. 22, 1910 Thursday

Reached Red Oak at 5:50 am.
Took breakfast at Evans/home.
Left for Shenandoah and Hamburg at 7:05 am.

The country between Red Oak and Shenandoah is typical rolling Kansas back from the valley.

The slopes eastward are very gentle & hills low. Westward they are higher

and more abrupt.

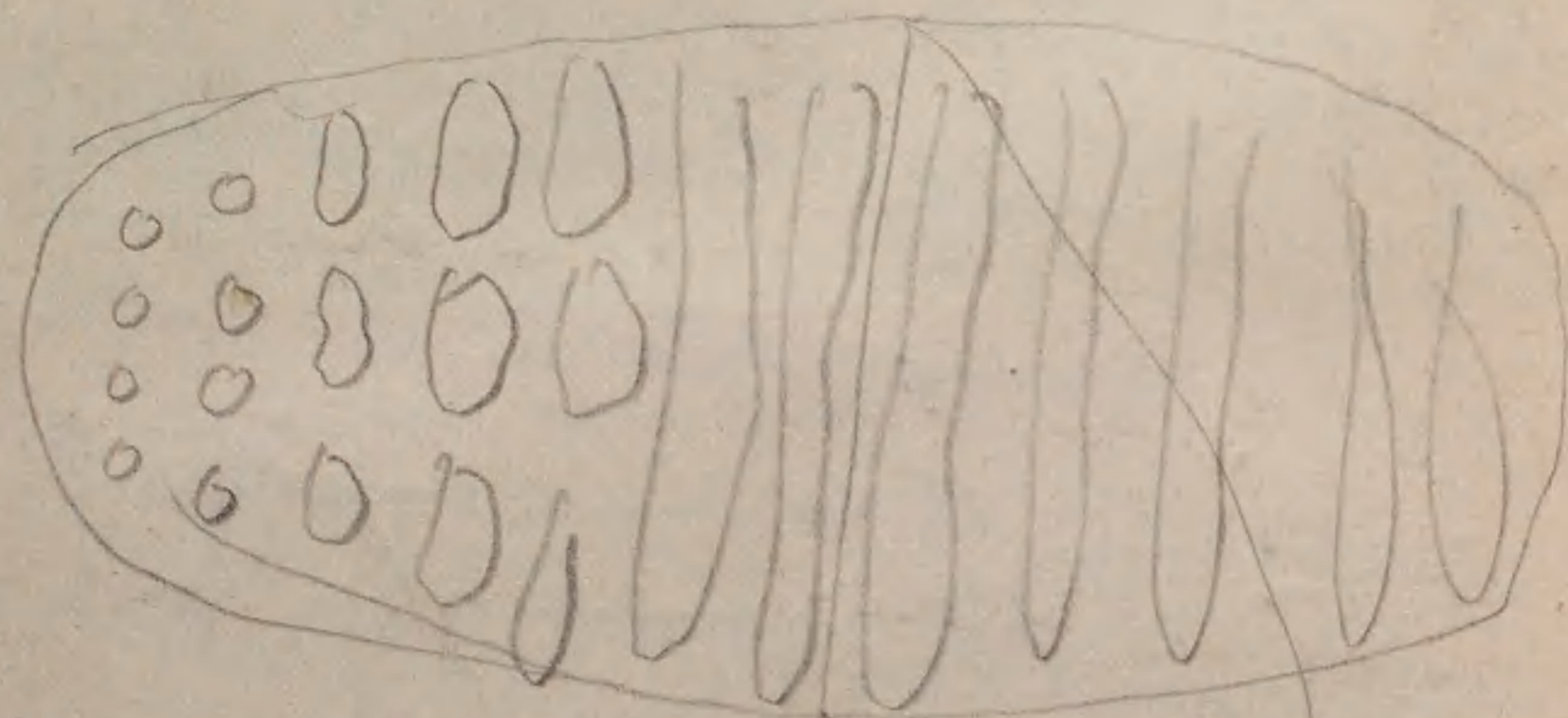
Dr. Geo. L. Smith. joined me at

Shenandoah, +

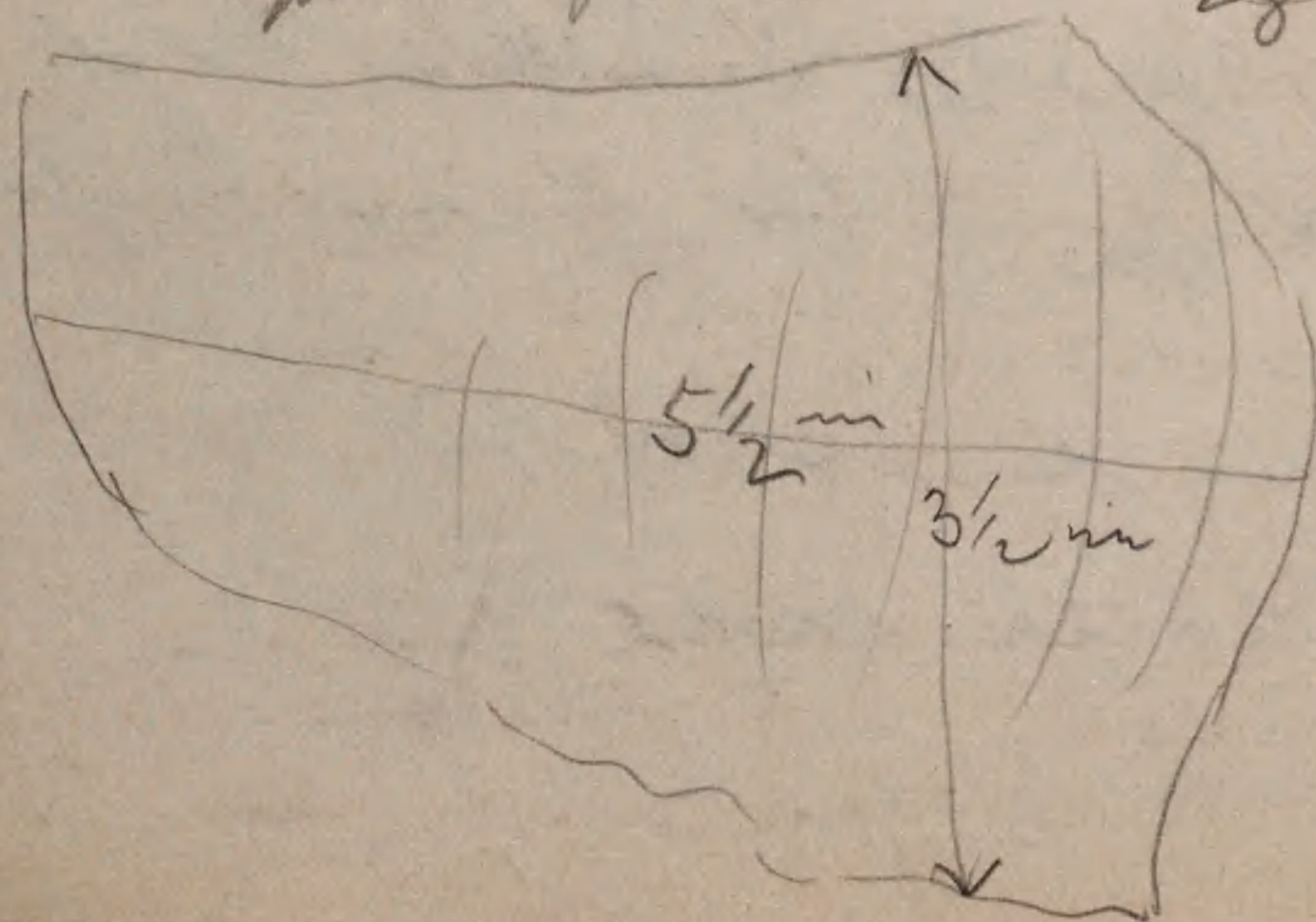
Visited farm of Wm. Savage
Hamburg, La.
W. of Riverton (near W. line of the.
23 J-68 RXLII.

The two specimens of teeth are
Elephas -

Smaller tooth shows $11\frac{1}{2}$ (or nearly 12)
plates in 4 inches.
7 plates in $2\frac{1}{2}$ inches



Material is heavy.
+ typical Aflorin



Larger tooth

5 plates in $1\frac{3}{8}$ in.

This is larger, broken &
heavy. Not in good shape
for identification.

Both were found loose in creek.

In deep bed of creek there
is a bed of gravel & what
appear to be heavy dark
silt with some streaks -
above loose & silt, stuff.
This deep creek gully
needs investigation.

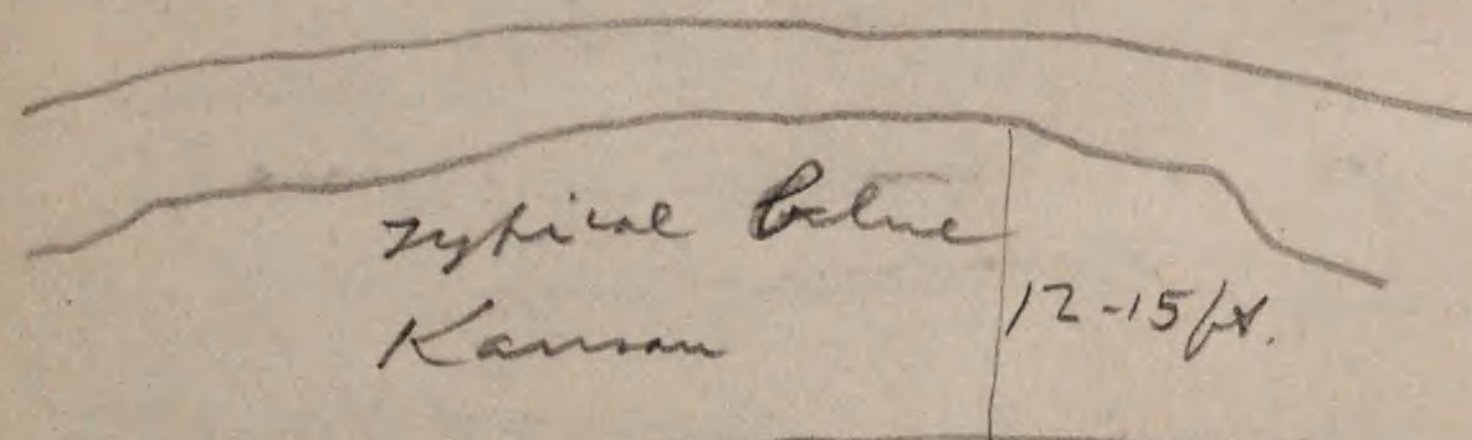
Returned to Hamburg and
took train for Langdon and
then went by the funny little
plug to Rockport.

Put up at Hotel Southern
There is much blue loess (thick) with
iron tubes) shown along road to
Sidney.

Drove to James M. Whitham's place in sec. 22-64-41. about 6 mi. south of Rockport - just at edge of bluffs. -

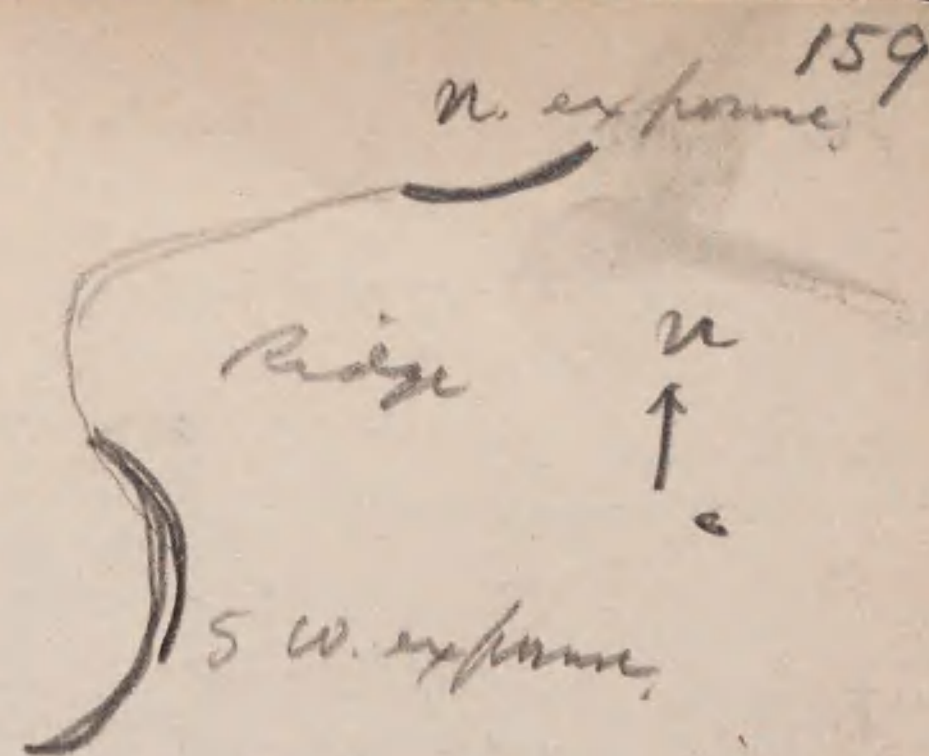
The Whitham gravel pits, - he works two close together, - are located back in the hills a short distance, and the base of the gravel, or top of cap rock lying just over a thin vein of coal, is 70 ft. above road on bottomland, & about 75 ft. above general bottomland.

The north pit, facing North, is as follows: Photos 3+4



15 ft oxidized sand & gravel, ferruginous, cross-bedded, with considerable MnO_2 .

Took photos 3+4 of N. pit - looking S



stream view 2/4/22

Kansan 12-15 ft.

nearby level. whitish silt - about 4 ft.

oxidized silt & gravel. 15 ft. to cap-rock (22 in.) above coal. Much MnO_2 . Contains bones, teeth, etc. Found fragments of clam shells.

Photos — — Same.

Took photos of S.W. pit, looking about east.

Photos 15-16.

Loamy Kansan.

Loveland 4 ft.

mostly calcareous, with
few pebbles, & small bones
some iron tubes etc.

12 ft Blue Kansan

Chocolate colored Kansan.

Sandy silty (whisk) Aftonian - 2 ft.

Under

6 ft

Oxidized, cross-bedded
sand

5 ft Gravel.

Slump.

Slump
etc.

161
The line between the Loveland & Kansan is sharp, and slightly irregular.

The lower line of the Kansan is about horizontal.

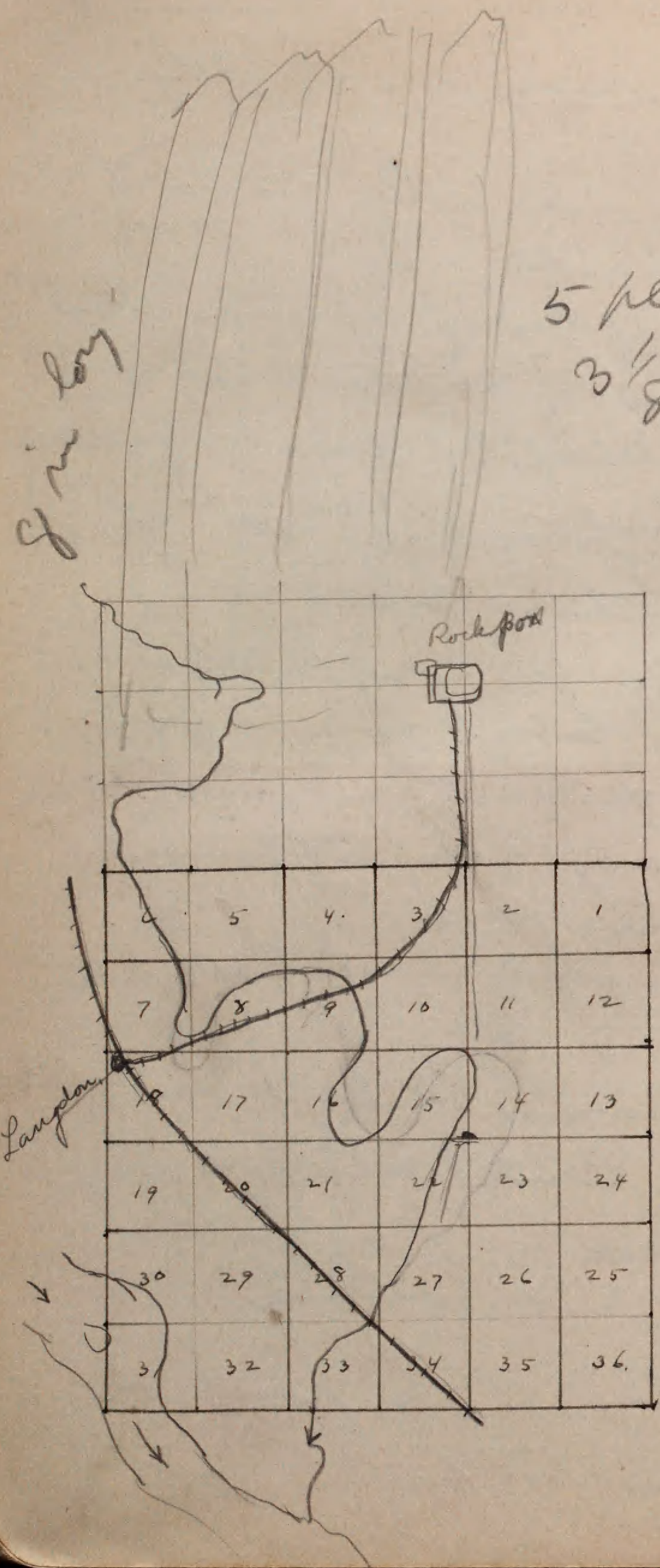
At base of bed of Aftonian there is a layer of boulders - not a continuous deposit, but more or less scattered. Examined bones and teeth at Mr. Whitman's house.

He has a few Buffalo & deer bones, & a buffalo horn - from slumby material - quite modern. Also heavy bones Aftonian bones. Horse bones. Also several horse teeth, etc.

also examined material in Atchison County Mail Office.

Two pieces - 1 a Buffalo femur, not Aftonian.

The other is a part of Elephant tooth.



5 plates in
3 1/8 inches.

On N. side of sec 22 - 3 1/2 miles
S. of Rockport, a road runs E. &
less than across a 40a. E.
the road cuts through top
of ridge.

This is yellow loess, with
bluish loess westward low down.

Fossils from yellow loess
(see box)

J. C. Greene
Mo. Geol. Survey.
was first to see the
Whitman pit, but
did not recognize the
Aftonian. Dr. Geo. L. Smith
did that.

Dec. 23 Friday.

Left Rock Port by launch for
Langdon at 7³⁰ am.

Left Langdon at 9:18 am
for Cornhill Bluffs.

Opposite (or above) Watcom Bluff
is a great crescent receding
east. At both points there
is exaggerated wave topography,
but middle of crescent has
low rounded bluffs.

Dr. Geo. L. Smith left me
at Hamburg.

Left Co. Bluffs at 5⁰⁵ pm home.

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Oct. 2-1910

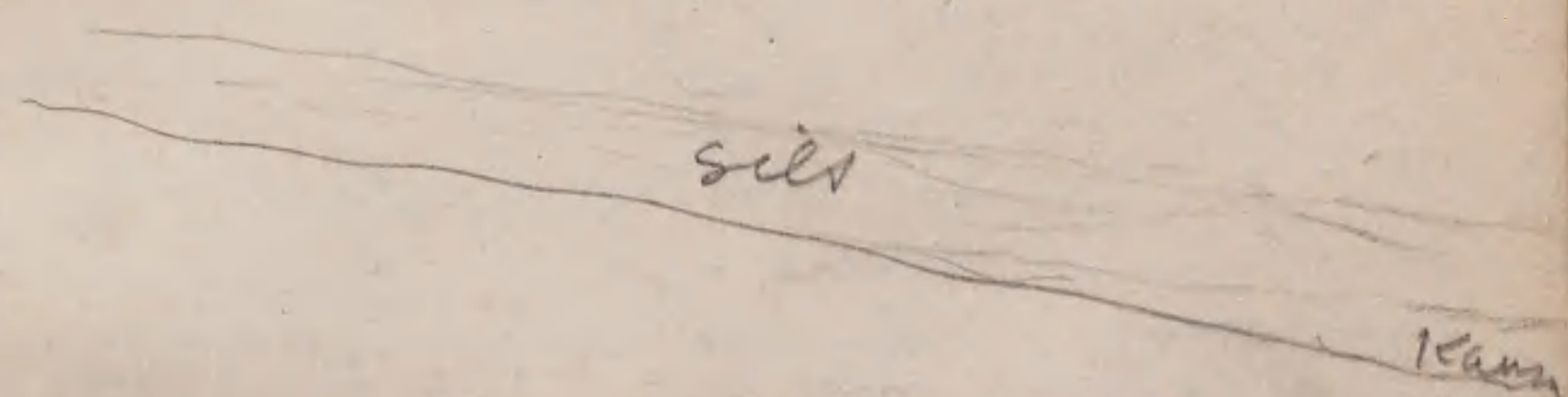
Drove W. from *Prunella calura*.
at Mr. Will's house, at center of
sec. 6 - $3\frac{1}{2}$ mi. west, the old pit
(W. of barn) is covered by RR, but
he has opened a new pit on the road
N. of RR.

In sec. 11 Seventy six sup.
S. of road there are deep
ravines & sharp ridges.
At x near bottom of ravine
there is very heavy bluish drift
(see sample) - this is in bank.

A little lower down streamlet a
silty gray silt & then gravel show.
The last is probably Aftonian, - the
first Kansan, though very thin.
Above the latter, some distance
up the slope water seeps out
of sandy clay. & still above
that yellow sand shows in gopher
heaps. This is evidently Illinoian
Collects fern, fungi, *Stemmatolites*, etc.
Many - fine - deep cover.

2 in sec. 11 is on rather steep
hill, well up. - along steepers
part of hill a silt band follows
slope of road - on N. side.

Illinoian (?)



The silt is dark & shaly
character from Illinoian?
here.

See sample of silt -
see Illinoian sample
taken 20 ft. above road.

The Illinoian (?) is a ^{rather} dark
silty clay with few pebbles
Silt band about 2 ft. deep
farther down slope Kansan
appears below it.

RR. cut sec. 10 - Seventy Six ^{Top}
this is E. of overhauled line (the
last part of it). The section on
N. side is as follows:

- 5 { 6-8 ft yellow joint clay - where
weathered, brown like.
- 4 { 6-8 ft Laminated sand - yellow - with streaks
of brown oxides - Probably water.
ft. plain - though not unlike joint. But horizontal
- 3 { Bluish red, 1-2 ft.
- 2 { Dark yellow, thin, finer above 3-4 ft
shades down into next
- 1 { Red joint clay with
8-10 ft. pebbles scattered

See samples of all.

No. 1 is very red & shows joint
structure & few pebbles

No. 2 - grades into 1 & above is
finer. Line between it & (3)
is sharp.

No. 3 has oxidized line above &
below.

No. 4 - shows lamination where weathered

There seems to be no real ¹⁷⁵ lens
here - too firmly.

On S. side cut is similar
except that 1, 2 & 3 are
obscured by talus.

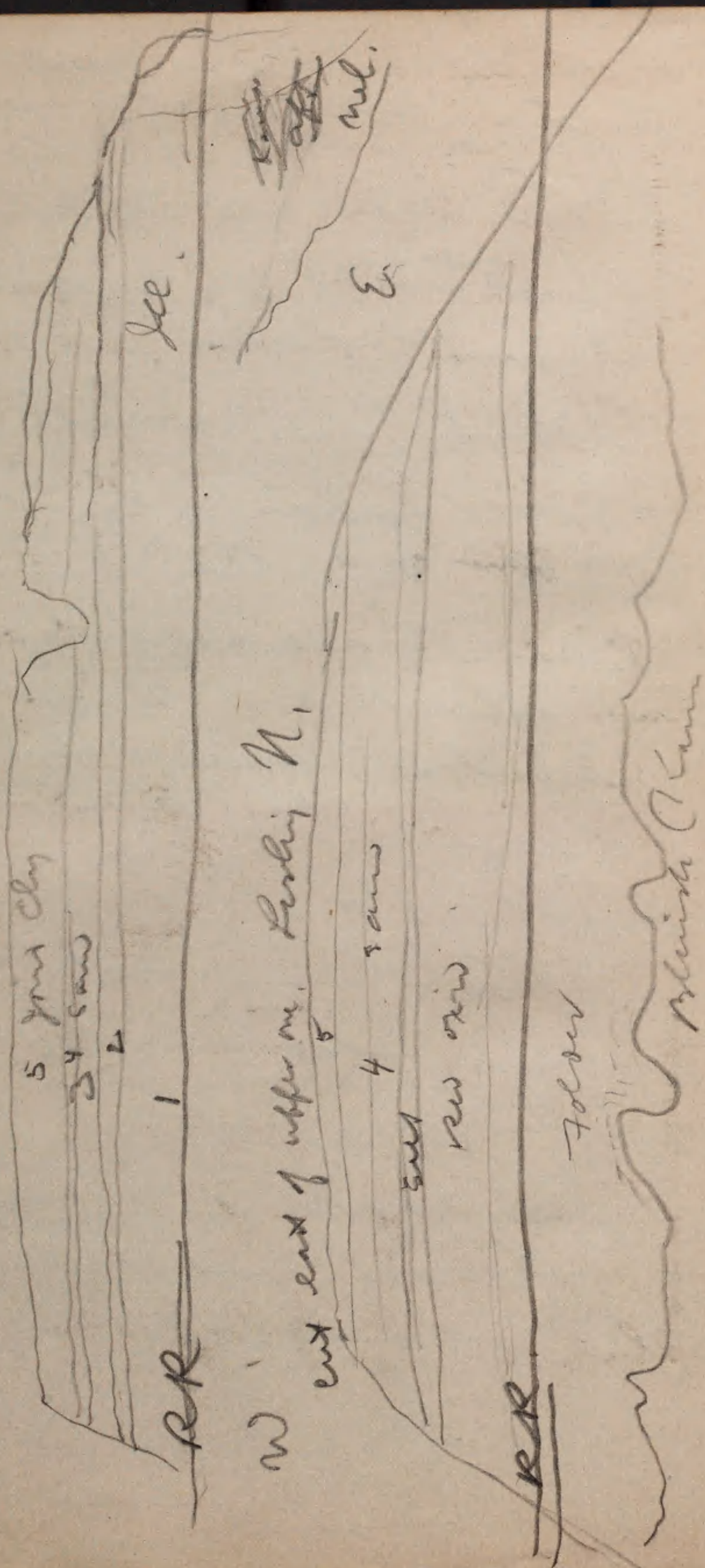
On the E. end a gutter runs
down & exposes - low down
dark Nebraska? (or is it
Karnian? red sample), above
it a thin sand & gravel &
above that Karnian. Then
Karnian & then to west
it all.

The Karnian, Apt. & Neb.
are below RR. which
here runs high.

Look sample of Karnian?

Spring runs out below Karnian.

N. side
cut in sec. 10 - just E. of roadcut

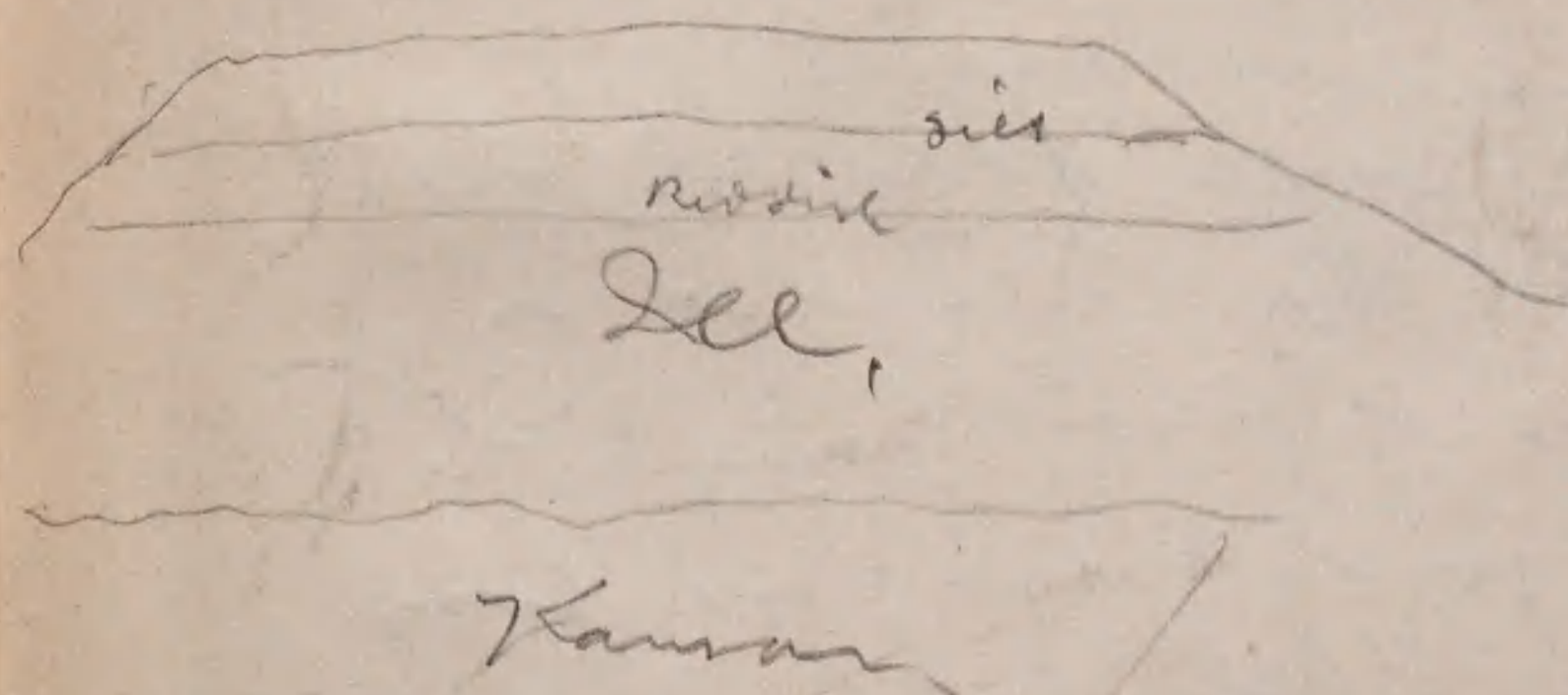


Just E. of this cut is another
(just W. of 1 mile to Sta. post
which runs away below RR
the 3rd cut E. is just E. of
1 mile to Sta. post & is very
similar to 2nd cut, but
not quite so good.

Other cuts above Eastman.

Plots 27 & 28 show W. end of
main part of first cut E. of
roadcut.

Plots 23 & 24 - 2nd cut - looking
NW.



Plots 11 & 12 - Pond along RR.
Trees dead.

What I ^{see samples} call ~~Kumuk~~ is
dark, but silty & with
scattered pebbles. There
must be 15-18 ft. of it.
The ice is yellow, with
small boulders & many
pebbles & must be 20 or
more feet thick. ~~(see sample)~~

Down 2. in gutter cuts
down & exposes several feet
of red sand & pebbles on
a heavy green silt (see
sample)

near center of sec. 35, Lake
drop there is a cut on
E. side of road showing 5-6
ft. of jointy clay - some long
above, & resting (sharply defined)
on yellow sand -

Oct. 1-1910

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Left Iowa City with Liddings
at 11 am & drove to

sand mound in afternoon from
Muscatine.

Collected plants (see next page)

Fungi - 3 puffballs, 2 Agarics

My big Muscatine exposure
(buried here) is opposite Main
street N. of Hersey Ave

Sand-mound - Louisa co 10/10

Aster sericeus
"
Lithospermum
Artemisia caudata
Andropogon scoparius
Boerhaavia oligantha
Helianthus occidentalis
Physalis
Cyclopogon atriplicifolius
Friedrichia floridana
Polygala verticillata
Polygonum tenue
Lespedeza capitata
Polygala sanguinea
Viola
Aster oblongifolius
Oxalis
Aster ludovicianus
Aster psilanthus

Sand-flat - Muscatine co 10/10¹⁸³

Helianthus (geminatus ??) small
Rudbeckia hirta
Achillea millefolium
Aster diffusus
Boerhaavia stricta - (wet)
Aster - (tridactylus ??)
Helianthus annuus
Eupatorium
Artemisia (dracunculoides?)
Lactuca

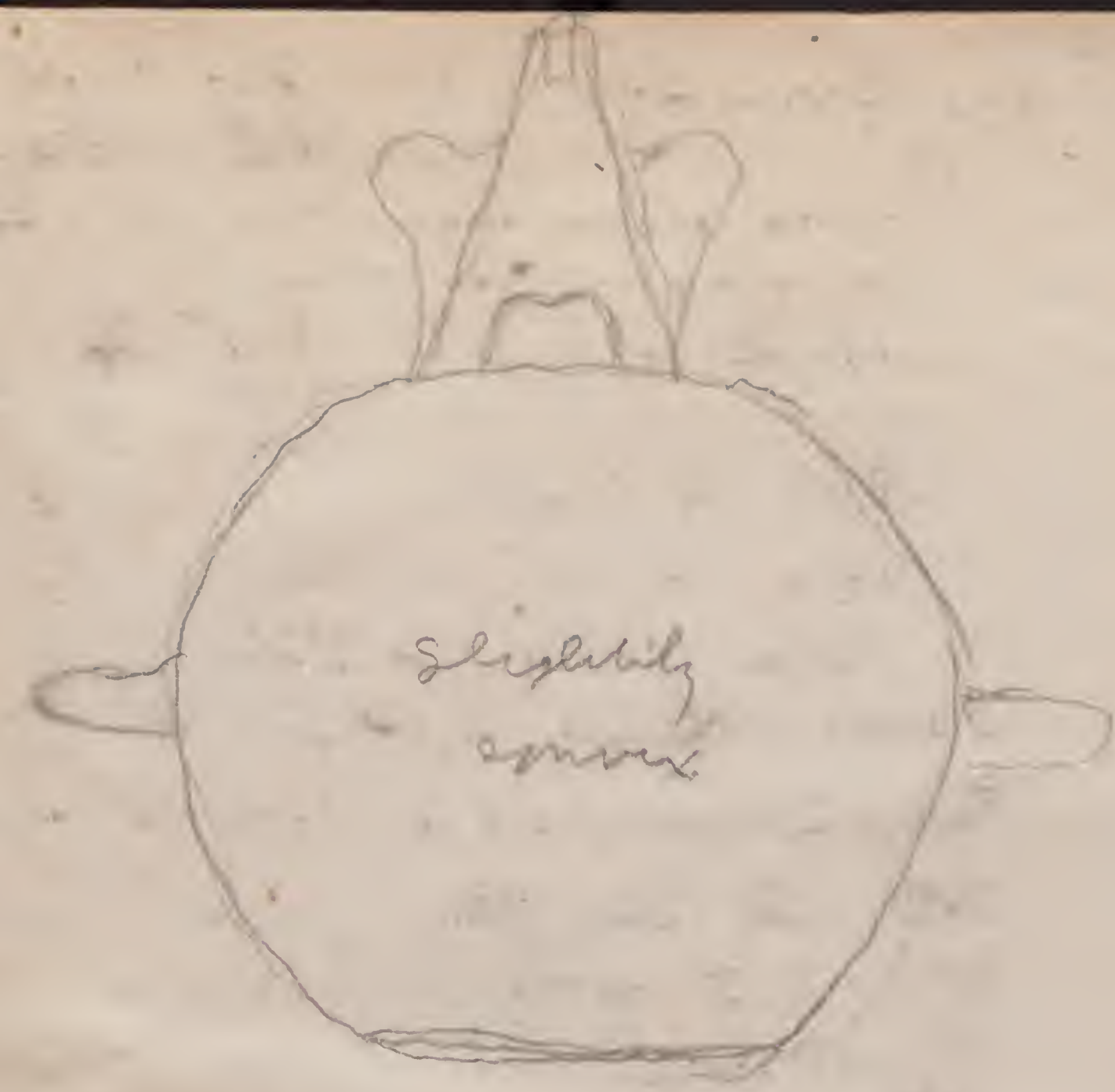
.75
 7.26 $\frac{1}{2}$
 1.50
 3.45
 3.87 $\frac{1}{2}$
 5.63
 4.64
 2.00
 2.20
 4.97
 1.56
 4.12
 4.85
 4.75
 1.75
 2.82
 2.00
 2.05
 1.25
 1.50
 4.25
 4.40
 2.69
 2.95
 2.50
 4.31
 4.56
 3.98
 2.70

Expt. Survey (con)

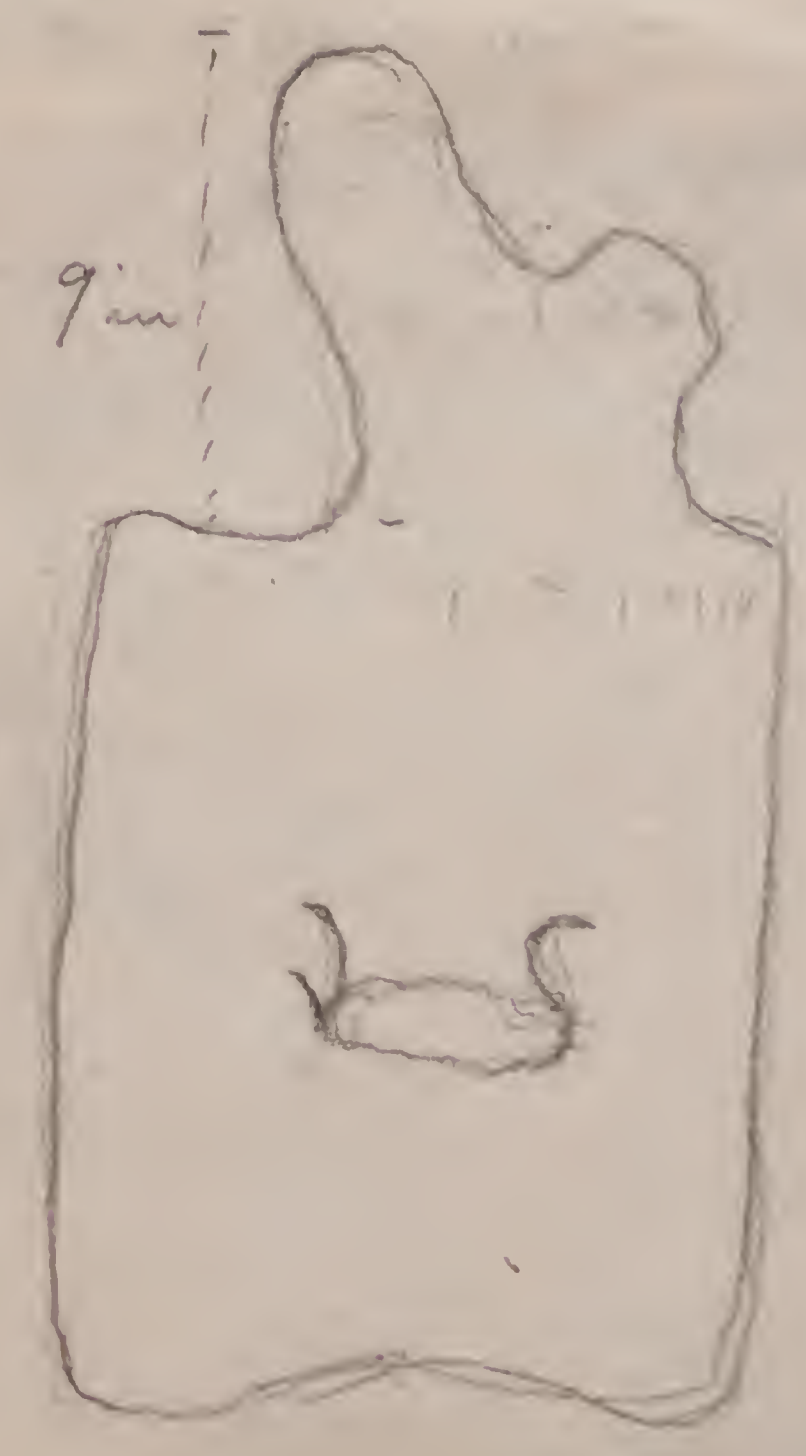
187

Sep. 5 - Breakfast, dinner,
 RR. to Fairview & return
 Supper, Gate City Rest - .44
 Room - Russell Hotel - .25
 Sep. 6 - Breakfast Russell - .50
 Fare to Hudson - .39
 Team " - 1.50
 Lunch (noon) " restaurant - .25
 RR. to Harwarden - .31
 Sep. 7 - Team at " - 2.50
 " 8 - RR. to Alton - .26
 Lunch - Alton - .20
 Team - feed - dinner - Restaurant ³⁵ 25 - .60
 Team - Alton - 2.50
 " 9 - RR. to Westfield - .11
 Lunch - Westfield Restaurant - .20
 Feeding team J. Tracy - .25
 Team - 2.50
 Supper & lodging, West Hotel - 1.00
 " 10 - Breakfast " " - .50
 RR. to Sioux City - .83
 Lunch (dinner) Franklin's Cafe - .25
 Carfare to & from M. R. R. - .10
 Horse & buggy " " - 1.00
 Supper, Franklin's Cafe - .30
 Room - West Hotel - 1.00
 Sep. 11 - RR. to Sargent's Bluff - .15
 Breakfast, Bluff Hotel - .35
 RR. to Sioux City - .15
 Dinner, ⁷⁵ supper ⁶⁵ - 1.40
 Room - West Hotel - 1.00
 Sep. 12 - RR. to Hornick - .51
 Breakfast, Commercial Hotel, Supper - .70
 Mr. A. E. Camp, Holly Springs ^{dinner & feed} .50
 Livery - Hornick - 2.50
 (Arlington Hotel, lodging, Rodney #4355) 50
 RR. to Rodney, Ia. - .24

Sep. 13 - Breakfast - Arlington - Rodney
 Dinner Central Hotel, Autha - \$35
 Horse-pew - living car " - 35
 Livery - Rodney - 2.50
Hotel Arlington - Lodging
Breakfast } 1.50
Supper
 RR. to Arim .79
 RR. to Mo. Valley .72
Room, Miller Hotel #4356 .50
 Sep. 14 - Room & Livery Rodney 1.50
Breakfast & dinner Miller's - 1.00
 RR. to Co. Bluffs - .43
 Street car to So. Omaha & return .30
 Lunch (supp) Boston Lunch room .25
 Room - Evans Hotel 1.00
 Sep. 15 - Street car to So. Omaha & return .30
 Breakfast & lunch for fields - Boston Lunch room .45
 Supper - Boston Lunch room .25
 RR. to Iowa City 5.24.
 Cab (storing) " " .25



Rear view.



Side view.

Bottle faces
of end view

Crustacean of Federal
 Bldg at Omaha
 White River from
 Valley Branch

Independence Oct. 1-1910
 RR to Independence \$ 1.42
 to Sioux City 119
 Muralin
 RR - .77

Oct. 8-1910
 RR to Cedar Rapids .50
 " " Independence .78
 cab " .25
 Lunch " .20

Large notebook - Co. Huffs
 center 1.4 1/2 in
 9 1/2 in
 Draw pencil case
 (See sketch on other side) 1.84

Rev. Jan Stefan Brz
 St. Joseph's Hospital
 Omaha, Neb.

H. A. Anderson
 Box 156
 Sioux City, Ia.

J. E. Carman
 Bayard
 Iowa

Paul J. Kruse
 Mabelton
 Ia

Eberhardt, in
 Bernhardt's drug store
 Sioux Falls

Albert Collins (father)
 C. J. Collins (son)
 Saw him - E. of
 Sioux Falls



